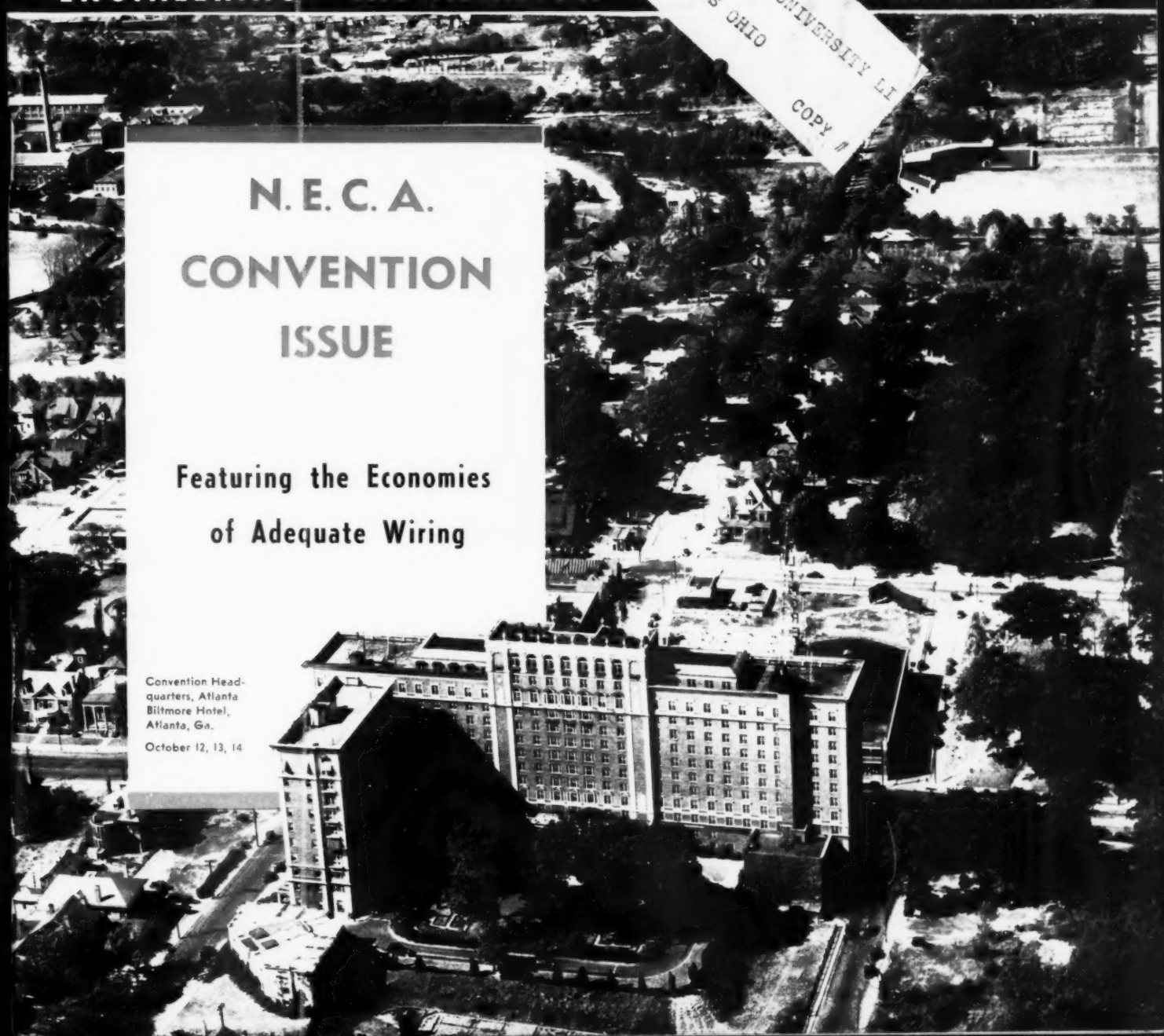
OCT. 1936

ELECTRICAL CONTRACTING

ENGINEERING • INSTALLATION • MARKETING



N. E. C. A. CONVENTION ISSUE

Featuring the Economies of Adequate Wiring

Convention Headquarters, Atlanta Biltmore Hotel, Atlanta, Ga.

October 12, 13, 14

A Pointer
ON G-E TIME SWITCHES

EASY INSTALLATION

YOU can make your wiring job on time-control installations easier by using G-E time switches. Liberal spacing below the terminal block, five convenient knock-outs for conduit connection, connecting lugs, and easy time-setting devices simplify your work. Wiring time and expense are reduced—on every installation you get the profits you should.

THEN TOO—

YOU'LL find that G-E time switches are always dependable. The heavy silver contacts, the reliable Telechron motor, and the sturdy design of the moving parts assure customer satisfaction that brings you repeat orders.

G-E time switches eliminate expensive, profit-consuming service calls. Once the switches are wired, you and your customer can forget them, for they will give the same fine service, year after year, without attention.

Use G-E time switches on your next sign or store-window lighting installation. For further information and prices, get in touch with the nearest office of the General Electric Supply Corporation or the General Electric Company.

GENERAL ELECTRIC

440-83

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Established 1901

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INSTALLATION

ENGINEERING

MAINTENANCE

REPAIRING

MANAGEMENT

MARKETING

for

ELECTRICAL CONTRACTORS
INDUSTRIAL
COMMERCIAL
RESIDENTIAL

ELECTRICAL INSPECTORS

ENGINEERS

SERVICE SHOPS

and others engaged in the business of electrical construction

ELECTRICAL CONTRACTING

With which is consolidated

The Electragist and Electrical Record

Vol. 35 **October, 1936** No. 12

CONTENTS

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CONDUCTORS

When you work against time — when every hour means a dollar—save *time and money* with U. S. "Cleanstrip" Safecote—the cleanest, fastest-stripping wire on the market—at regular Safecote prices. U. S. "Cleanstrip" eliminates retinning after stripping—no time lost in joining and soldering.

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OCTOBER 1936

Conventions

EACH year thousands of business men go to conventions—state, district, and national conventions of their own business associations. Why? There are many reasons, some obvious, and some equally important though less apparent.

SOME people just naturally like to go to meetings, and engage in association work. They are on committees, or they are interested in certain association politics. Their enthusiasm helps to build up interest on the part of less active members. These dyed-in-the-wool members are in a sense the backbone of any association membership.

OTHERS go to a convention to hear the papers, or even one particular paper or report, in which they are vitally interested. Some have a point of view that they want to get a hearing. Some go to see the exhibits and get a quick picture of the new things. A great many people go to conventions to talk to other men who are engaged in the same occupation in some other city. Perhaps they have a problem, or they may be thinking of trying out something new. What do others think about it? Has anybody had any experience in that direction?

AND then there are a lot of people who go to conventions just to meet old friends again and have a good time. While some of the more serious minded members are at times exasperated with these brothers, it must not be thought that they get nothing out of the convention. In fact it is possible that they may at times be the major beneficiaries of these meetings. They make friends in different parts of the country, and who can tell when one of these friends might not be able to be of real service? It has often happened that a contractor in one city has recommended a convention friend for a job in another section of the country. Many a time a contractor taking a job in another city has called upon a convention friend in that city to set him straight with the local boys.

THERE are a lot of angles to a convention that many people seem to miss. Even the entertainment of the ladies is not without its business values. Valuable business friendships have received their start at a bridge table or on a shopping tour. Many a man has said that he takes his wife to conventions so she can cultivate the wives of men he would like to know better.

OF course, conventions can be a sheer waste of time and money to a great many people, but to men who know how to get at the hidden assets of such meetings, they can be extremely valuable in terms of business and friendship.

notes:—

for wide awake contractors

Important selling opportunities are opening up every day — for alert contractors. By showing that electrical efficiency is the road to profits, alert contractors are turning small orders into big jobs. Here are some pointers:

Note:—Obsolete wiring hinders efficiency, both in industry and commerce. New wiring layout can mean more efficiency — profits. Sell the idea. Prove the point with dependable supplies from Graybar.

Note:—Better lighting increases production per man in office and factory. A good basis to sell lighting. Turn to Graybar for all kinds of up-to-date fixtures and glassware.

Note:—Check up on motors, too. Graybar can back you up with prompt service on full line of standard motors and control.

Note:—Interphones. Signals. All profitable items for the Contractor. Sell them as time and energy savers.

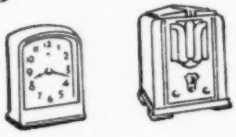
Graybar

Electric Company

Offices in 79 principal cities.
Executive offices, Graybar Building, New York, N.Y.

P.S.

P.S.—And more profits this year in Graybar household appliances. Complete line, standard merchandise, delivery service from stock, good profit margin.



ELECTRICAL CONTRACTING

Vol. 35 OCTOBER, 1936 No. 12

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S. B. Williams, Editor

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FIELD BRIEFS

● A REWIRING CAMPAIGN on commercial buildings will be started shortly by the Toronto Electric Service League. Specifications have been prepared.

● THE NUMBER of electrical fatalities in the United States, other than those from lightning, according to Census figures, was 575 in 1933 and 623 in 1934, or an average of around 600 a year.

● A NEW WAY of demonstrating house wiring to the public—a cellophane house with all of the wiring and connections visible through transparent walls. To be shown at Boulder Dam Power Inaugural Show at Los Angeles starting October 9. This is part of a campaign to promote a greater electrical market.

● INVESTIGATIONS in some 2,500 industrial plants by the I.E.S. Committee on Industrial and School Lighting showed an average of 2.85 foot candles of illumination. The average age of the lighting equipment found was 8.7 years and the average wattage per outlet was 121.

● MORE THAN 4,800 electricians have been taken off relief rolls, according to figures made public by the Works Progress Administration, and given WPA jobs.

● FULLY ONE-HALF of all the farms enjoying central station service consume less than 30 kw.-hr. per month, according to Commissioner Basil Manly in the Federal Power Commission's recent study of rural electric service costs. When only lighting and a few appliances are used, the wiring, obviously, is not very large.

● ELECTRICAL MODERNIZATION is reaching the government buildings at Washington. Announcement has been made that the Washington Monument will be rewired and an emergency system installed to insure the lighting of the shaft at all times. A changeover from d.c. to a.c. is scheduled for the Veterans Administration, Land Office, old Patent Office, and old Post Office buildings.

● AN ELECTRIC INTERPRETING system offering a choice of four languages was available to each of the delegates to the Third World Power Conference in Washington, September 7 to 12. As a paper was read, official interpreters translated it into three other languages and the delegates merely plugged in to the desired language on their individual instruments. The only two available units in the world were brought here from Europe, and a third constructed. Three electric "stenographers" took down the 800,000 words in four languages at the Conference and had the job completed as soon as the last speaker had finished talking. Supersensitive microphones picked up the voices and carried the impulses to a receiver which translated them into vibrations and thence through needles to cylinders.

These men are eight years older than when this picture was taken. There have been no new apprentices in their community in the meantime.

Survey Shows

Widespread Shortage

A DEFINITE shortage of skilled electricians has developed that is much more widespread than any previous information has indicated. Even in the larger cities where new commercial building construction has not yet shown any great improvement, the supply of good mechanics is very small.

To get the facts on the labor situation and to find out what if anything is being done about it, ELECTRICAL CONTRACTING has just made a survey in thirty-six cities having a combined population in excess of twenty-two million people. Information from two-thirds of these cities was secured by personal investigation by staff members and from the remaining cities information came by mail. The local situation is given below.

In spite of this condition which has been developing for the past year, with a few exceptions nothing is being done about it. In fact the International Brotherhood of Electrical Workers does not recognize any shortage. At the I. B. E. W. offices in Washington, a representative of ELECTRICAL CONTRACTING was told that, while there had been a sharp rise in employment, there was not even an impending shortage of union wiremen nationally. He was also told that the Brotherhood would guarantee to supply, on demand, any number of skilled electrical workers who might be required "any place in the United States."

On the other hand. I. B. E. W.'s own employment figures seem to indicate very rapid recovery from the low depression employment figures. The last union figures available are for 1935 and show an average employment of inside wiremen of 55 per cent as compared with 25 per cent in 1933. Since that time, the amount of building work has increased considerably so that the current average employment of union men should be much larger.

In those cities where no shortage has been felt so far, the employers report very few if any good men available. The unemployed are almost entirely second grade men,

SURVEY OF SKILLED LABOR

BOSTON and WORCESTER, Mass., and PROVIDENCE, R. I.:—Good men difficult to obtain but the supply generally is reasonably satisfactory. This situation is due to small amount of large work. Good men are commanding high rates in open shops that work on a sliding scale. Plenty of helpers are available. Trade schools sending out ample supply of inexperienced men who must be broken in. Because the work is mostly small jobbing requiring skilled men, there is little opportunity for the less capable men.

HARTFORD, Conn.:—No shortage of skilled men yet but 10 per cent more work would develop a shortage. There is a shortage of helpers which is responsible for higher labor costs. The average cost per man hour has risen to 10 cents hour over 1929–1930 with no change in scale. The worst shortage is expected five years from now because the men, for the most part, are now between 50 and 60 years old. Nothing is being done to rectify the situation but the trade schools could do a job. Instead, they let pupils study at work which pays now. Young men want guarantees of work and promotion.

NEW YORK, N. Y.:—Plenty of mechanics available but very few helpers. Men are getting older and no new blood is being introduced. One shop is working eighty men with only one helper. New working conditions are 6-hours, 5-day week. Should a labor scarcity arise, 6-hour day will be expanded to 7-hours.

WASHINGTON, D. C.:—Every electrical worker is at work. Some men have been brought from Baltimore in the past few weeks. Government building program has created shortage, also short work week.

RICHMOND, Va.:—There is a shortage all along the line, being practically impossible to hire an electrician who has had any experience whatever even to poor men. Nothing is being done to build up the number of apprentices.

ATLANTA, Ga.:—All first-class men are employed and a shortage will develop as business improves. The shortage is principally in large work, there being plenty of house wiring mechanics available. There seems to be an excess of poor men. The con-

and few of them, or "cripples." These men cannot be sent out on a job alone. They can be used for fill-in work where they are under the direction of more competent workmen.

Should the improvement in construction volume continue, it is evident that the shortage will become acute even in those cities now reporting a plentiful supply of labor. While there has been some moving of men to take care of shortages, it is apparent that this cannot be depended upon for relief if there is any appreciable increase in new construction.

# of Electricians

by S. B. Williams
Editor, Electrical Contracting

Because there has been no training of men during the past five years, helpers are almost non-existent. One large operator, for instance, has eighty men at work and but one helper. This is the real dangerous part of the whole situation, that there are almost no young men in training to build up the ranks.

The journeymen of 1927, when building was at its peak, were on the average over thirty years old. Today those men are ten years older. In one city, for instance, it was reported that the average age of journeymen electricians is between 50 and 60 years. The implications of this situation need no explanation.

Moreover, the lack of helpers means that only men in the top wage bracket are employed. What effect has this condition on labor costs? In one city the average labor cost per man-hour is 10 to 12 cents higher today than it was six years ago although the scale has not changed. The reason given is that all journeymen crews are more costly. On the other hand it might be that older men are slower, or perhaps a bit of both.

Because of the uncertainty of labor costs brought about by the shortage, one large industrial contractor states that he is contemplating taking no more work on a contract price.

Nevertheless, very little is being done to bring new men into the trade. A new 30-hour agreement in New York provides for a 7-hour day if and when a shortage prevails, and in San Francisco the 6-hour 5-day week has given place to a 40-hour week with provision for 7-hour days when unemployment amounts to 20 per cent of the union membership. Portland, Ore., is negotiating for an 8-hour day to take the place of the present 6-hour day. The Memphis local is permitting one helper with each three journeymen and several employers now have an apprentice for the first time in years. Salt Lake City reports that their local now permits one registered apprentice to each shop and an additional apprentice for each three journeymen.

A few cities report trade schools as offering an opportunity for training young men but it is stated that these lads, when they finish their schooling, need a lot of practical experience. And even these schools are not turning out many future electricians because the boys are not sold on permanency of employment. Contractors in one city reported that apprentices wanted guarantees of employment and advancement.

While the electrical industry is no worse than any other branch of the building construction industry, there is no use denying the fact that it has been lax in giving proper consideration to the whole subject of employment problems. Why should there be these periods of unemployment and short work years when there is so much electrical work that needs attention? When reinspection shows hundreds of millions of dollars worth of defective wiring needing correction and a greater number of hundreds of millions of dollars worth of inadequate wiring, it is strange to understand why there should ever be unemployment.

The two national organizations,

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tractors are making every effort to build up their ranks with first-class men and helpers.

MIAMI, Fla.:—No good men available. Contractors using any kind of mechanics they can get. Union is importing mechanics from out of town.

MEMPHIS, Tenn.:—No shortage of good men although all of them are working most of the time. Poorer class of workmen are idle. Because of increasing private work and two low-cost housing projects, a shortage is expected in the winter and spring. The shortage is expected to be felt in skilled men on conduit work. Union's attitude toward apprentices is changing. The last agreement is more liberal, permitting one helper for each three journeymen. Several employers now have an apprentice for the first time in years.

BIRMINGHAM, Ala.:—While skilled labor is scarce in the region, there has been no difficulty in the city because of the small volume of work. If one large job came up, however, it would be difficult to man it. The shortage is in conduit men although house wiremen are none too plentiful. The secondary supply of poorer mechanics is not large. Some contractors are preparing to put in some apprentices but nothing definite has been done as yet. The union is not taking any steps in that direction.

DALLAS, Texas:—Centennial work required importing labor from other cities.

SAN ANTONIO, Texas:—No shortage of union men reported. Non-union and ex-union workmen overrunning city as contractors, because of defunct licensing law.

HOUSTON, Texas:—Large volume of public construction work has made it difficult for contractors to secure men for alteration work. Non-union contractors doing mostly their own work, partners and relatives working with cheap apprentices.

FORT WORTH, Texas.—Spring and summer shortage of skilled labor because of public projects and Frontier celebration work.

TULSA, Okla.:—Experienced men are hard to get. Shops that let their men go several years ago must face the

I. B. E. W., representing employees and N. E. C. A., representing employers, have a joint responsibility that cannot be ignored. New blood must be recruited to fill out the ranks and these men should receive a training based upon a mutually accepted standard. The union membership must be open to these men even if there still are unemployed members. The union must understand that they have something more than just a responsibility to the members. The strength of their own cause will be advanced in no small measure by the manner in which they serve the employers with competent mechanics.

This and similar kinds of rough work suggest the possibility of a new classification, the "semi-skilled".

While these two organizations are seeking ways and means of building up the ranks, they might undertake a study of the average workman. How old is he? What is his working life expectancy as a journeyman electrician? What is the effect of age upon his efficiency? Also it would be well to know, out of every 100 mechanics, how many are good, how many fair, and how many "cripples." And finally the "average" job should be studied to determine

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responsibility of training additional help as business picks up. Those who apply for work are unreliable for all-round work.

WICHITA, Kans.:—Open shop city. Men have become scarce with an increase in business. Local union being reorganized to take in some ex-members. Wages have been so unstable that contractors prefer a uniform cost rather than gamble on the competition of wage rates on better jobs.

TOPEKA, Kans.:—Not enough business to create shortage.

KANSAS CITY, Mo.:—Union men are becoming scarce. Some complaints regarding the use of "cripples" at high rates of pay as being harmful to union shops. No noticeable apprenticeship movement under way.

LINCOLN, Neb.:—Small local, controls only major building work. Union shops are not getting enough work to notice a labor shortage. Non-union men at 40 cents to 65 cents are plentiful.

OMAHA, Neb.:—Union men becoming scarce, but not much done as yet to introduce apprentices. Some non-union employers are lending men between shops, while smaller operators "hire" out to each other to fill out their slack periods.

DES MOINES, Ia.:—Mechanics are becoming scarce. No new apprentices have been developed for a great many years.

MOLINE, Ill.:—Contractors are crowded for enough experienced men to handle their work. Because of a close-working association, they are making out fairly well through trading men between shops. A recent let-up in business will ease the pressure.

INDIANAPOLIS, Ind.:—Definite shortage of skilled men in large work, even a shortage of poor men. Nothing is being done to help the situation. Government provides competition for labor by offering soft jobs to people whom the contractors could call on.

CHICAGO, Ill.:—No trouble getting men, but average efficiency is lower due to lack of young blood. No plan reported regarding apprenticeship activity.

BUFFALO, N. Y.:—Almost impossible to hire good skilled electricians who will do a day's work. There are a few poor men available for fill-in but they must have continuous supervision. Nothing being done to improve the situation although there are a number of good helpers available who, with a few months training, could become excellent mechanics. Union is unwilling to permit the creation of any new journeymen until all of the members are employed.

DETROIT, Mich.:—No shortage and none anticipated.

CLEVELAND, O.:—Present supply sufficient although there is a shortage of good men. General shortage will develop within the next year or two with present rate of business improvement if no material additions are made to the union. Average age of men increasing and no new men coming in.

MILWAUKEE, Wis.:—Skilled mechanics becoming scarce although the local union claims to have plenty of men available for industrial or commercial work. During the depression, its members were placed in power company and street railway service to keep its local membership static. These men are being released to contractors as needed. Special attention is said to be directed to manning the industrial contractors and service shop crews to hold this business in line. Non-union shops are busy, and recruit their extra help from among the family, or from trade schools, at low rates of pay. Some are said to work for 5 cents and 30 cents per hour.

TWIN CITIES, Minn.:—No shortage yet although few skilled men are available. Any pick-up in construction would create a decided shortage. No program of apprenticeship.

SALT LAKE CITY, Utah:—A shortage of good men exists although plenty of poor men are available. The local union has allowed each shop one registered apprentice and an additional apprentice for each three journeymen.

PORTLAND, Ore.:—No good men available and few fair men. Poor men still to be had. Boneville has taken most of the available men. Shortage covers both large and small work. Contractors negotiating with union for 8-hour instead of 6-hour day. Union taking in some new men. Some contractors taking on apprentices. Vocational school men are being sent out by union as helpers to become rounded out in their training.

SAN FRANCISCO, Cal.:—Shortage is being felt but it is not acute enough to be a problem. A shortage will develop as soon as the exposition work starts. The shortage now is chiefly one of good mechanics, there being plenty of poor men. A conference was held recently in apprenticeship training but with little progress. A new agreement puts the working day back to 8 hours from 6 hours.

LOS ANGELES, Cal.:—Great demand for skilled electricians with a shortage developing all along the line. The firms doing the industrial change-over work for the Bureau of Power and Light have agreed to take each other's men and have arranged to pool extra hands in case there is a shortage in one shop and a surplus in another.

FRESNO, Cal.:—Definite shortage. Number of new building projects not started because of general shortage of building mechanics. Repair work made to wait because of new work.

the characteristics of its labor content. How much rough labor such as chasing, material handling, etc., is being done by journeymen on larger jobs? Is skilled all-round electrical workmanship required for every part of the job? Such a study might indicate the possibilities of meeting the present shortage by setting up a new class of electrical labor, the semi-skilled, for purely mechanical operations, such as roughing-in and panel board setting. The skilled group could do the connecting up and finishing. The time to train the semi-skilled would be shorter.

This is not a new thought altogether because contractors have long recognized the existence of specialists among their workmen. Certain of the huskies could throw conduit in better than the other fellows, but on signal work they would be almost worthless, while slight fellows with nimble fingers were excellent on connecting up, but tired easily in heavy roughing-in.

The problem of a sufficient labor supply is definitely with us. Age, sickness, injuries, and other occupations have reduced the ranks. No new crop of electricians is in the making. The responsibility for finding a solution lies upon the organized groups.

Sales Pointers

for contractors doing specialty work

10 "MUSTS"
for the Specialist

1. *Study your specialty and learn all there is to know about the equipment, both electrical and mechanical.*

2. *Keep in mind that mechanics are seldom thoroughly familiar with control equipment.*

3. *Conduct training sessions with the men to keep them up to the minute regarding new developments in equipment.*

4. *Cooperate to develop trouble-free layouts.*

5. *Encourage the discussion of all knotty problems in group meetings.*

6. *See that each job is finished neatly and correctly.*

7. *Maintain an accurate and efficient job control system.*

8. *Know the exact cost of each completed job.*

9. *Help your accounts by boosting their equipment to the purchaser.*

10. *Don't attempt to render service below a fair margin of profit.*

EXPERTLY installed specialties pay such rich returns in satisfied customers and low service calls that equipment sales organizations can't afford to gamble with irresponsible contractors, says H. E. Honey, Brunswick Electric Company, Chicago, Ill. By sticking to this firm conviction, Mr. Honey has been successful in convincing ten well-known stoker sales agencies that a high-grade installation is more profitable to their business than having such work done at skinned prices. He gets from 15 to 50 per cent more for his work than was paid before and makes them like it.

When general construction work dropped off in 1930, Mr. Honey decided to specialize. He chose to build up the wiring for heating and ventilating installations. The upshot has been a business that involves a peak crew of 25 men and four service trucks. Having succeeded in selling the wiring of heating and ventilating equipment, the company branched out to include the complete installation of stokers until this business now includes summer servicing to fill in during the slack season. New installations amount to as many as 25 per day in the fall rush, while during July they drop to about 5 per day.

In attempting to break in on this business, Mr. Honey found the prevailing market very unprofitable and the type of installations very poor. Not discouraged, he offered to install several jobs at a cheap price, only for the purpose of showing the difference in workmanship, the difference in neat and substantial types of material, and the reaction to courteous treatment of the purchaser. As a result, one large sales organization agreed to a higher installation price than it had been paying. This finally led to all the residential and commercial installation work for ten organizations covering Cook County, Ill.

This business didn't come in all at once. It came only after months of hard plugging and persistent sales effort had caused the various sales organizations to analyze their own service cost records. Mr. Honey went out on some of their complaint jobs and pointed out how correct installation practice would have prevented their trouble. He exhibited his model installations, and obtained favorable expressions from the customer to contrast with the complaints that were made by customers whose installations had simply been "thrown in."

The work of getting these accounts and holding them is divided between steady personal contacts, close daily supervision of all orders, regular mailings of circulars and stuffing blotters, many phone calls, and the full use of all friendly business relations. Mr. Honey gets on the job early each day to clean up all leftovers and to check up with his men. The balance of the day is spent among prospective customers, to run down knotty problems, and to find out ways of doing a better job than before.

While a new windowless 6th floor was being added, this old office building was remodelled to provide air conditioning on all floors. New service conductors, feeders and spare branch circuits were provided in a layout of adequate wiring that was designed to conform to modern lighting intensities.

For serving the remodelled building, a new 3 ph., 4-wire service was installed which comprised four 1,500,000 c.m. conductors in 6-in. conduit.

Modernization Adequacy

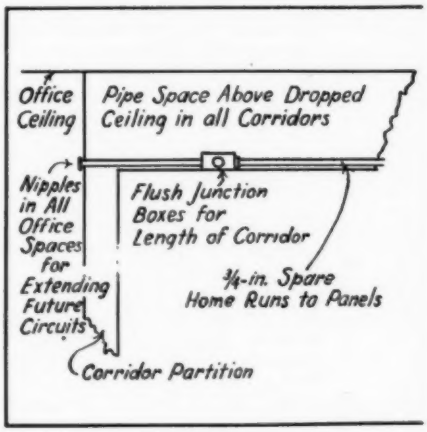
IN REMODELLING a 29-year old, 5-story office building at Lincoln, Neb., for its home office, an insurance company added a windowless sixth floor, provided air conditioning throughout, and is having the electrical system modernized to meet future adequacy requirements. Its own quarters on the new sixth floor were provided with an underfloor duct system, while the lower rental spaces and street floor shops were also rewired to permit the use of modern lighting intensities.

Although this building has an area of only about 4600 sq. ft. per floor, its new feeder system and switchboard is supplied with a three-phase, 4-wire service consisting of 1,500,000 c.m. service conductors in 6-in. conduit. The balance of this capacity beyond the air conditioning power load of 125 hp., and a new passenger elevator, is taken up by lighting and miscellaneous power.

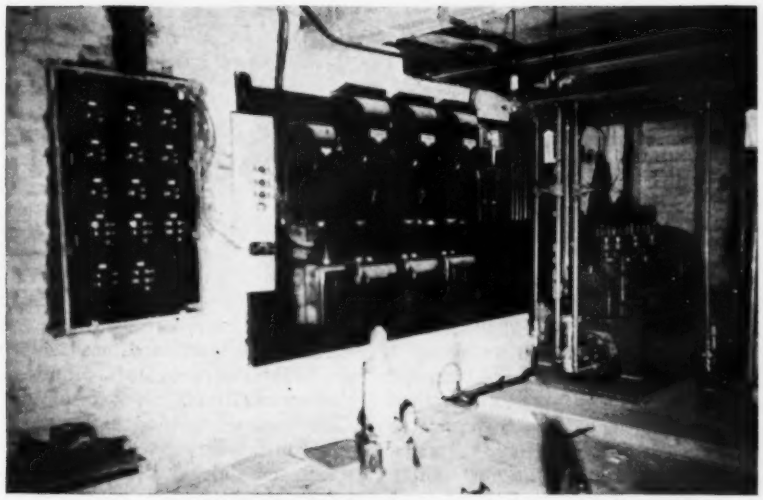
A system of spare home run raceways was provided on each office floor between the panelboard closet and a series of equally-spaced flush junction boxes along the full length of the corridor ceiling. This system, which supplements the existing office wiring, will permit the extension of additional lighting branch circuits into any office suite without marring the corridors. Branch circuit wiring can be installed within suites to suit tenant needs by using underplaster extension wiring materials, or surface raceways.

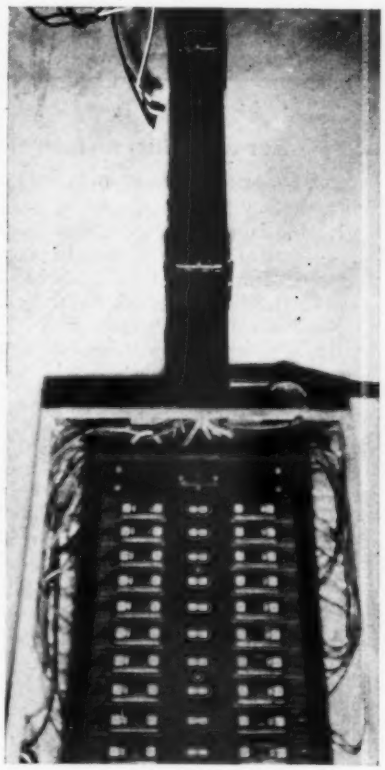
Because the additional lighting circuits that may be needed in the offices could not be run across the floors, the furred corridor ceilings provided a convenient space for concealing these spare raceways. The system of interconnecting raceways makes it possible to rearrange the wiring on any floor, or at any office suite. As tenant changes are made for serving doctors and other heavy users of current, the concealed raceways are expected to provide a flexible means of routing any additional conductors that may be required.

Here then is a building made serviceable in keeping with modern office standards, wherein adequate wiring facilities were an important part of the modernization program. The wiring was installed by the Dresback Electric Company of Lincoln, Neb.



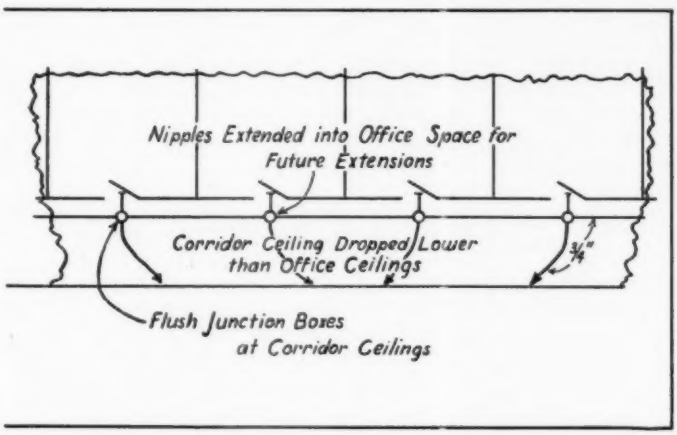
Controls for three 25 hp. compressor motors were grouped near their equipment, while fourteen remote controls and pilots for outlying auxiliary motors were assembled in a special panel that was placed alongside the compressor controls.





Each floor was equipped with its air conditioning unit to operate in conjunction with the main air conditioning plant. Remote control and pilot lamp stations for each of the 3 hp. 2-speed motors were provided in the basement machinery room.

Former meter closets on all floors were stripped of old open cutouts and switches. New non-metering type branch circuit panel boards were installed with wireways extended up to the ceiling. The new branch circuit raceway runs were terminated in spacious collecting or junction boxes at the upper end of the vertical wireways.



The corridor ceilings were suspended to conceal all of the various pipes and a system of spare home run raceways was installed between a row of flush junction boxes and the panel board. These spares are expected to simplify the routing of additional lighting branch circuits into any office spaces. Future tenant changes will be possible without disturbing the finished corridors, because equally spaced nipples were extended through the corridor partitions for connections to be made to them within any office space.

Step-by-Step Estimating Costs

TO AID its members in quoting on residence wiring, the Edison Club of Milwaukee developed a set of wiring costs that are intended to provide an equitable unit method of pricing such work. A committee of eleven contractors held thirteen meetings in this compilation. These units may be readily applied to a schedule of outlets without making detailed material takeoffs. Data on special service capacities, as for cooking, or for more than the average number of circuits, are also provided.

All estimating units were compiled at net cost plus 20 per cent overhead. A labor rate of 87½ cents per hour was used. These values are shown here at net cost, however, to avoid confusion and to facilitate making cost adjustments to suit conditions in other localities.

The wiring method upon which these units are based is armored cable branch circuits and rigid conduit in the basement. Service and range installation costs are based on conduit wiring.

As an example of how to use these units, a sample schedule of outlets for a one-family residence is listed. A service entrance of three No. 4 wires has been specified, to supply a 6-circuit panelboard and an 8-kw. range.

Sample Wiring Schedule

Outlets	*Wiring*	*Unit*	*Extension*
14 Ceiling	Arm. Cable	$1.17	$16.38
2 Ceiling	Conduit	2.29	4.58
11 Wall Bracket	Arm. Cable	1.19	13.09
22 Convenience	Arm. Cable	1.40	30.80
1 Polarity Recept. Laundry	Conduit	2.20	2.20
11 Switch S. P.	Arm. Cable	1.38	15.18
1 Switch S. P.	Conduit	2.58	2.58
4 Switch, 3-way	Arm. Cable	1.80	7.20
1 Switch, 4-way	Arm. Cable	4.04	4.04
1 Door Switch	Arm. Cable	4.04	4.04
1 Range run, 20 ft.	Conduit		12.48
1 Range Connection			4.15
1 Service	3 No. 4 in 1¼-in. cond.		33.03
Add for 6 circ.	Panelboard		4.99
Add for ground	1 No. 8 in ½-in. cond.		5.27
1 Radio Outlet Front & Rear, P. B., with combination bell	Open wiring		3.06
	Open wiring from transformer		3.72
Total Cost			$166.79

No allowance is included for permit, insurance, drayage or other expense items.

Service Entrances

(Ground runs not included)

1. One-family, 1 or 2-circuit; two No. 8's in ¾-in. conduit $13.51
   25 ft. ¾-in. conduit, 70 ft. No. 8 wire, ¾-in. service fitting, ¾-in. LB fitting, 3 locknuts, 2 bushings, 1 ground bushing, 2-circuit service switch combination, meter socket, 3 fuses, miscellaneous and meter board, labor 4 hours.

2. One-family, 4 circuit; three No. 8's in 1-in. conduit $17.17
   25 ft. 1-in. conduit, 105 ft. No. 8 wire, 1-in. service fitting, 1-in. LB fitting, 3 locknuts, 2 bushings, 1 ground bushing, 4-circuit 30-amp. service switch combination, meter socket, 6 fuses, miscellaneous and meter board, labor 5½ hours.

3. One-family, 8 circuit; three No. 6's in 1-in. conduit $25.00
   25 ft. 1-in. conduit, 105 ft. No. 6 wire, 1-in. service fitting, 1-in. LB fitting, 3 locknuts, 2 bushings, 1 ground bushing, 8-circuit and 60-amp. service switch combination, meter socket, 2 50-amp. fuses, 8 15-amp. plug fuses, miscellaneous and meter board, labor 6 hours.

4. Two-family, two 4-circuit; three No. 6's in 1-in. conduit $27.90
   30 ft. 1-in. conduit, 130 ft. No. 6 wire, 1-in. service fitting, 1-in. LB fitting, 3 locknuts, 2 bushings, 1

for Residence Wiring

ground bushing, two 4-circuit 30-amp. service switch combinations, 2 meter sockets, 4 30-amp. fuses, 8 15-amp. fuses, miscellaneous and meter board, labor 6 hours.

5. Two-family, two 6-circuit; three No. 6's in 1-in. conduit.....$33.80

30 ft. 1-in. conduit, 130 ft. No. 6 wire, 1-in. service fitting, 1-in. LB fitting, 3 locknuts, 2 bushings, 1 ground bushing, two 6-circuit 60-amp. service switch combinations, 2 meter sockets, 4 50-amp. fuses, 12 15-amp. fuses, miscellaneous and meter board, labor 6 hours.

6. Single-family; three No. 4's in 1¼-in. conduit (panelboard not included) $33.03

24 ft. 1¼-in. conduit, 90 ft. No. 4 wire, 1¼-in. service fitting, 1¼-in. LB fitting, 1 1¼-in. ell and 2 couplings, 5 locknuts, 2 bushings, 1 ground bushing, 100-amp. service switch, meter trough, 2 70-amp. fuses, miscellaneous and meter board; labor 7 hours.

7. Two-family; three No. 4's in 1¼-in. conduit (panelboards are not included) $35.93

25 ft. 1¼-in. conduit, 102 ft. No. 4 wire, 1¼-in. service fitting, 1¼-in. LB fitting, 1 1¼-in ell and 2 couplings, 9 locknuts, 4 bushings, 1 ground bushing, 2 60-amp. service switches, 2 meter troughs, 4 50-amp. fuses, miscellaneous and meter board, labor 8 hours.

8. Single-family; three No. 1's in 1½-in. conduit (panelboard not included) $39.61

25 ft. 1½-in. conduit, 90 ft. No. 1 wire, 1½-in. service fitting, 1½-in. LB fitting, 1½-in. ell and coupling, 5 locknuts, 2 bushings, 1 ground bushing, 100-amp. service switch, meter trough, 2 100-amp. fuses, miscellaneous and meter board, labor 8 hours.

9. Two-family, three No. 1's in 1½-in. conduit (panelboard not included) $42.78

25 ft. 1½-in. conduit, 102 ft. No. 1 wire, 12 ft. No. 4 wire, 1½-in. service fitting, 1½-in. LB fitting, 1½-in. ell and coupling, 2 1½-in. locknuts, 2 1½-in. bushings, 7 1-in. locknuts and bushings, 1½-in. grounding bushing, 2 60-amp. service switches, 2 meter troughs, 4 60-amp. fuses, miscellaneous and meter board, labor 9 hours.

Additional cost of ground connections for all foregoing services.....$ 5.27

30 ft. ½-in. conduit, 60 ft. No. 8 bare copper wire, ½-in. locknut and bushing, 4 ½-in. straps, ground fitting, labor 2 hours.

Additional cost of panelboards used in connection with service layouts Nos. 6, 7, 8 or 9:

4-circuit	$ 3.13
6-circuit	$ 4.99
8-circuit	$ 6.83
10-circuit	$ 8.76
12-circuit	$12.10

Branch Circuit Estimating Units

Armored Cable Outlets

Ceiling	$ 1.17
Bracket	$ 1.19
Conv. Outlet	$ 1.40
S. P. Switch	$ 1.38
One 3-way Switch	$ 1.80
One 4-way Switch	$ 4.04
Door Switch	$ 4.04
Pilot Light (ganged)	$ 2.09

Miscellaneous Work

2 push buttons, transformer and combination bell	$ 3.72
4 push buttons, 2 bells, for two-family job	$ 5.25
Extra transformer	$ 1.07
Extra buzzer	$ 0.95
Door opener	$ 3.75
Speaking tube, 25-ft. run, 5 ells	$ 3.85
Radio outlet	$ 3.06
Additional radio outlet	$ 1.66

Conduit Outlets, Basement & Garage

Laundry, Polarized ceiling drop plug outlet	$ 2.20
Conv. outlet	$ 2.58
Ceiling outlet	$ 2.29
S. P. Switch, basement	$ 2.58
S. P. Switch, garage	$ 3.06
Two 3-way switches in garage	$ 4.87
Underground service to garage, 30 ft. from S. P. switch, No. 14 duplex L. C. in ¾-in. conduit	$11.29
Underground service to garage; 30 ft. two-way control, 4 No. 14 L. C. in ¾-in. conduit	$22.61

Range Wiring

20 ft. run, 3 No. 8's in 1-in. conduit, including 60-amp. switch and wall junction box	$12.48
Connections between range and wall junction box	$ 4.15

Quick Factory Wiring

A RUSH wiring installation for a new cookie and cracker plant at Omaha, Neb., was recently let on short notice. The layout for lighting and about 500 hp. in small motors was made to allow advance installation work to proceed in all parts of the 176-ft. wide and 426-ft. long building. Methods were adopted by the E. C. Bennett Electric Company that permitted the installation of exposed feeder and branch circuit raceways as soon as the layout was ready. This work was scheduled to follow all accessible areas in the building. Soon after arrival of special machinery, its motors and controls could be connected and placed in service.


1


2

1. Nine 3½-in. and 3-in. feeder conduits were terminated above the main switchboard location pending its arrival on the job. The basement walls were poured before underground raceways for the main service feeders could be installed to the outdoor transformer station. Boxed openings were therefore provided in the basement wall for these raceways to be installed when the outside and basement grading was completed.

2. Feeder conduits were installed in groups against the basement ceiling before concrete was poured for the basement floor. Lines were established for all long grouped runs to permit installing this work in sections between junction boxes. Each conduit was supported separately by ring hangers spaced about 8 ft. apart, and anchored to the concrete ceiling. Cable splicing boxes were used at the approximate locations of panelboards above. This method permitted the feeder conduit runs to be installed on the basement ceiling without regard to possible variations in the actual panelboard locations above the basement.

3. Expansion joints in various sections of the building necessitated similar provisions being made for feeder conduits. Here a 15-in. by 30-in., 8-in. deep telescopic screw-cover box was provided for two 3-in. conduits. Grounding bushings and a jumper within the box will insure continuity of ground current path.

4. Branch circuits were run exposed in electrical metallic tubing to all general locations, pending the final spotting of outlets. For lighting the shipping docks a sidewall run of two 1¼-in. raceways was brought to the first of a series of 6-in. by 8-in. junction boxes which were equipped with split covers. The final horizontal runs extending out to beam outlets were made from the upper halves of these covers without offsets being required.


3


4

DEMONSTRATIONS *Will Sell* Better Lighting

by George W. Patterson
Patterson Electric, Ltd., Toronto, Canada

FIND the opportunity to tell your customer the better vision story of Better Light-Better Sight, get his permission to make a trial or demonstration installation, leave a sight meter with him and then leave him alone for a few days. The demonstration, if properly installed, will sell itself. At least that has been our experience.

Let me give two examples of jobs we succesfully sold this year, one a factory and the other an office. In both cases, we had a wiring modernization job to begin with and that created the opportunity to present the Better Light-Better Sight story of lighting modernization.

The demonstration of industrial lighting was a simple system which we originated. It consisted of a 4-in. square junction box with mounting bar, four long arm pull switches, and five porcelain bushings, 50 ft. of all rubber feed wire and 14/2 all rubber leads of various lengths, up to 50 ft. On three of these leads we installed a different type of industrial unit (R.L.M., Glasteel and prismatic glass) and on the fourth a bare lamp. With this demonstration one can stand at the switches and alternate the units for comparison. This installation was made in half an hour without interfering with any of the customer's operations.

Before and after pictures of the office job that gave 12 times as much light for 2½ times as much current and banished headaches.

Customer Sold Himself

The customer was left alone for several days while the workmen had an opportunity to work under the better conditions. The customer made his own selection and sold himself. He could see by the sight meter we had left with him that with the lighting he was using he was getting from zero in several places to 15 foot-candles right under the lights, which incidentally were only on the machines. The new Glasteel units which he selected with 300-watt lamps spaced 12-ft. apart gave him 13 to 15 foot-candles everywhere and at only a 15 per cent increase in current.

In the office job, we made a trial installation of two indirect fixtures of different styles and both fairly expensive. This was after we had pointed out to the office manager that nine out of his ten clerks wore glasses.

Again the customer was left alone with a sight meter and he could read that he was getting from zero to 2 foot-candles with the old lighting while the new units stepped the light up to 13 to 15 foot-candles. The result was that the customer purchased the first units to be sold in Canada of a brand new design. The new installation has stepped his current up from 200 to 500 watts per unit or two and one-half times but he secures more than twelve times as much light.

Incidentally one of the clerks, when asked by the manager how she liked the new lighting said, "I have been here for over ten years and last night was the first time I went home without a headache."

It has been our experience that when customers have the chance to actually see and work under good lighting they invariably take the best, which is usually the most expensive, but that all the arguments in the world would not make them buy without a demonstration.

Construction . . Methods . . . .

Housing Project Load Center

The circuit breaker panelboards in various two-family houses that are under construction at a Milwaukee, Wis., Federal Housing project were placed back-to-back near the rear outer wall. Exact spacings were necessary because the 11-in. by 11-in. cabinets straddled a tile partition, while separate horizontal 1-in. nipples had to be extended through the rear walls to meter fittings on the rear porches. The meter fittings also set back-to-back and project outward from the rear wall. Uniform cabinet spacings were obtained by means of four 5-in. long all-thread galvanized tie-bolts, using hex nuts at both ends inside of each pair of cabinets. Runs of rigid conduit extending downward, upward and out to the meter fittings provided a rigid assembly for the tile mason.

The Parklawn housing project includes accomodations for 518 families in two-family houses and multi-family apartments, for which

the Uihlein Electric Company of Milwaukee has the wiring contract. Each load center controls a range outlet and from two to three lighting branch circuits. Service connections are made within a pipe space under these buildings, wherein the feeder network is installed.

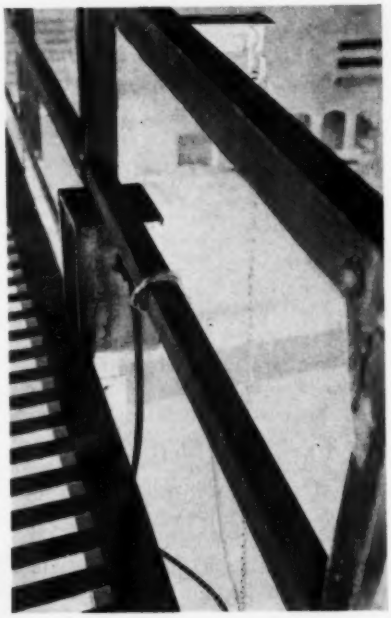
Close-to-Floor Tubing Bender

A standard 90-deg. elbow pipe fitting, when adapted to a bender for electrical metallic tubing, makes this tool suitable for moving or off-setting stubs that project upward from concrete floor slabs. The normal position of the handle when attached without an elbow fitting is at an

angle which interferes with making bends close to the floor line.

Suspending Arena Fixtures for Easy Maintenance

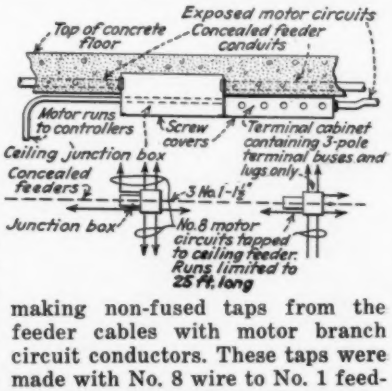
About ninety 750-watt main lighting fixtures in the new armory at Jersey City, N. J., were suspended from steel catwalks or lamp bridges near the domed roof. These were equipped for easy re-lamping, cleaning or replacement from this safe working position. Each fixture was provided on the catwalk level with a 30-amp. stage pocket and plug connection. A 1½-in. by 1½-in. angle iron bracket was extended out from the catwalk handrail, from which the fixture was suspended by a 10-ft. chain and hook ring. As an added precaution, and as an easier means of raising the fixture by hand for maintenance, a sash weight cord was also provided. This cord was tied



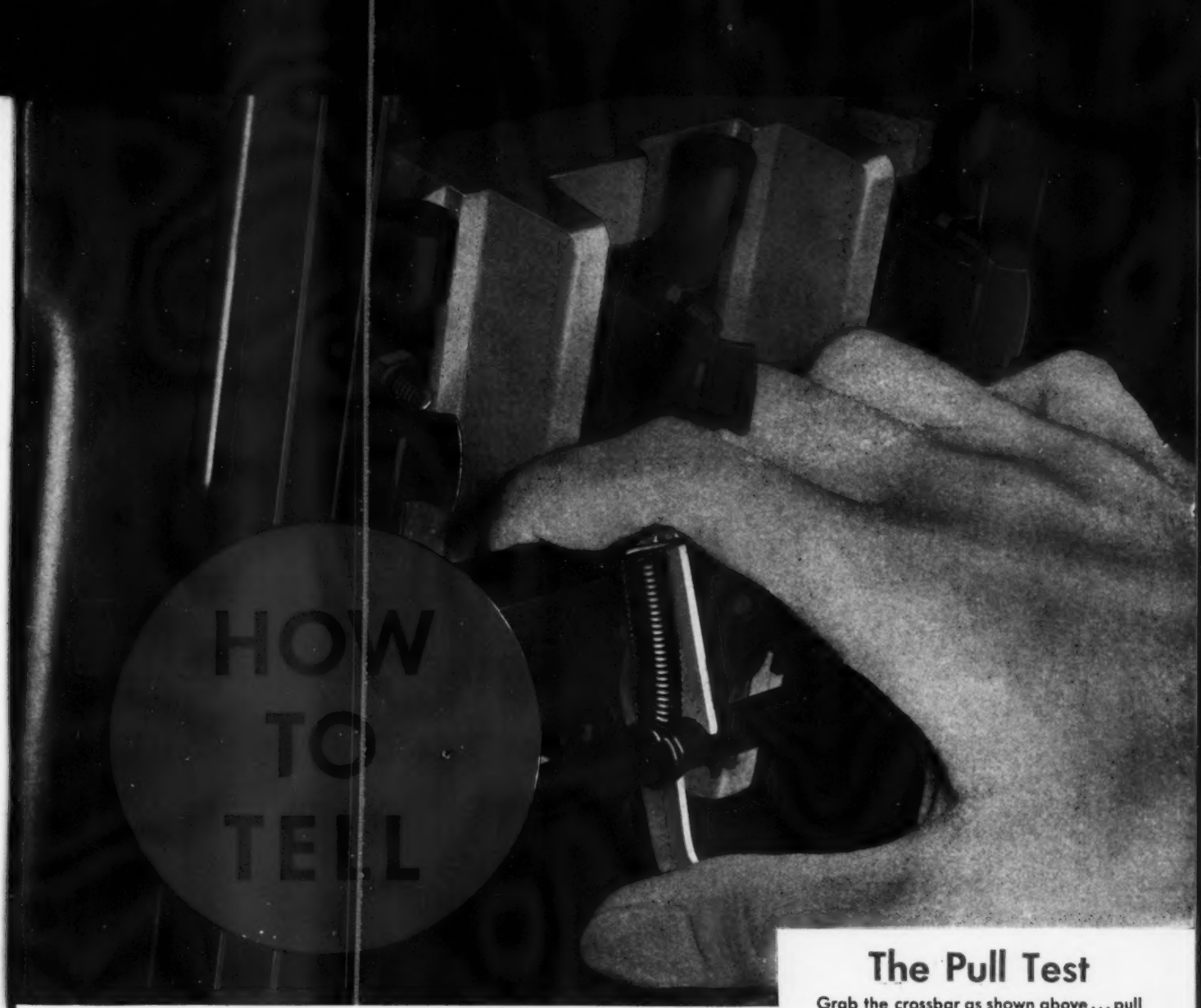
to the middle rail and to the fixture loop. This equipment was installed by Joseph Newman, Inc., local electrical contractor.

Overhead Radial Tap-Circuits for Motor Wiring

Ceiling junction boxes of the half-in, half-out screw cover type were installed in the concrete in connection with concealed raceways for power feeders, to permit the installation of exposed motor wiring after machinery was finally set in place. Beside each ceiling junction box was mounted a special terminal panel which contained 3-pole busses and lug connections to facilitate



making non-fused taps from the feeder cables with motor branch circuit conductors. These taps were made with No. 8 wire to No. 1 feeders, and with No. 12 or No. 10 wire where taps were made on No. 6 feeders. By placing these junction



The Pull Test

Grab the crossbar as shown above... pull the blades out by hand. If it is easy to pull the blades out, pressure is weak, contact is faulty, and the switch will not give satisfactory service. On the other hand, if the blades are hard to free, held firmly, as in C-H Switches, you have excellent contact, long life, super-satisfaction.

a GOOD Type D Switch

THE primary purpose of any safety switch is to make, to carry, and to break a current. Proper current-carrying capacity demands strong pressure of the jaws on the blades. If pressure is weak, contact becomes faulty, heating develops and trouble begins.

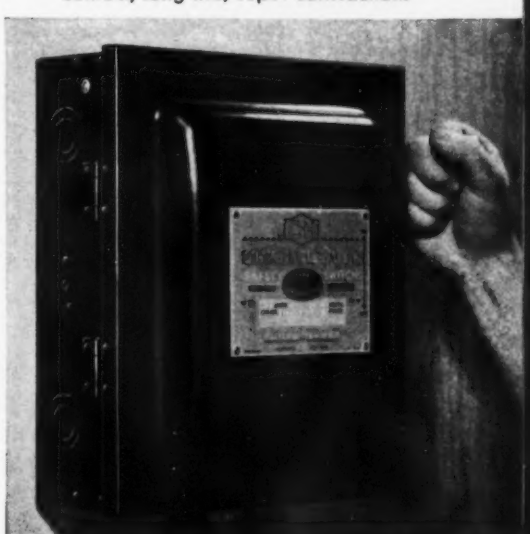
With the growing demand for long and satisfactory switch life, additional precautions must be taken. You have to measure... you have to KNOW... what the trade needs to give that service regardless of whether it be a Type A switch, a Type C or a Type D. However, we repeat, the *basic* requirement of any safety switch, for any service, is adequate contact pressure.

Study the C-H line to see how each type is built *especially* to meet the needs for which you want to use it. Then note that regardless of which switch you select, there will be no departure from time-tested principles. You *actually* get adequate contact pressure in every Cutler-Hammer switch. Thus, you can select it with the full knowledge that you are getting the best switch *time, talent* and *money* can produce. Your business is *safest* with the C-H Safety Switch line... leaders in Current-Carrying equipment. CUTLER-HAMMER, Inc., *Pioneer Manufacturers of Electric Control Apparatus,* 1306 St. Paul Avenue, Milwaukee, Wis.

CUTLER-HAMMER

C-H

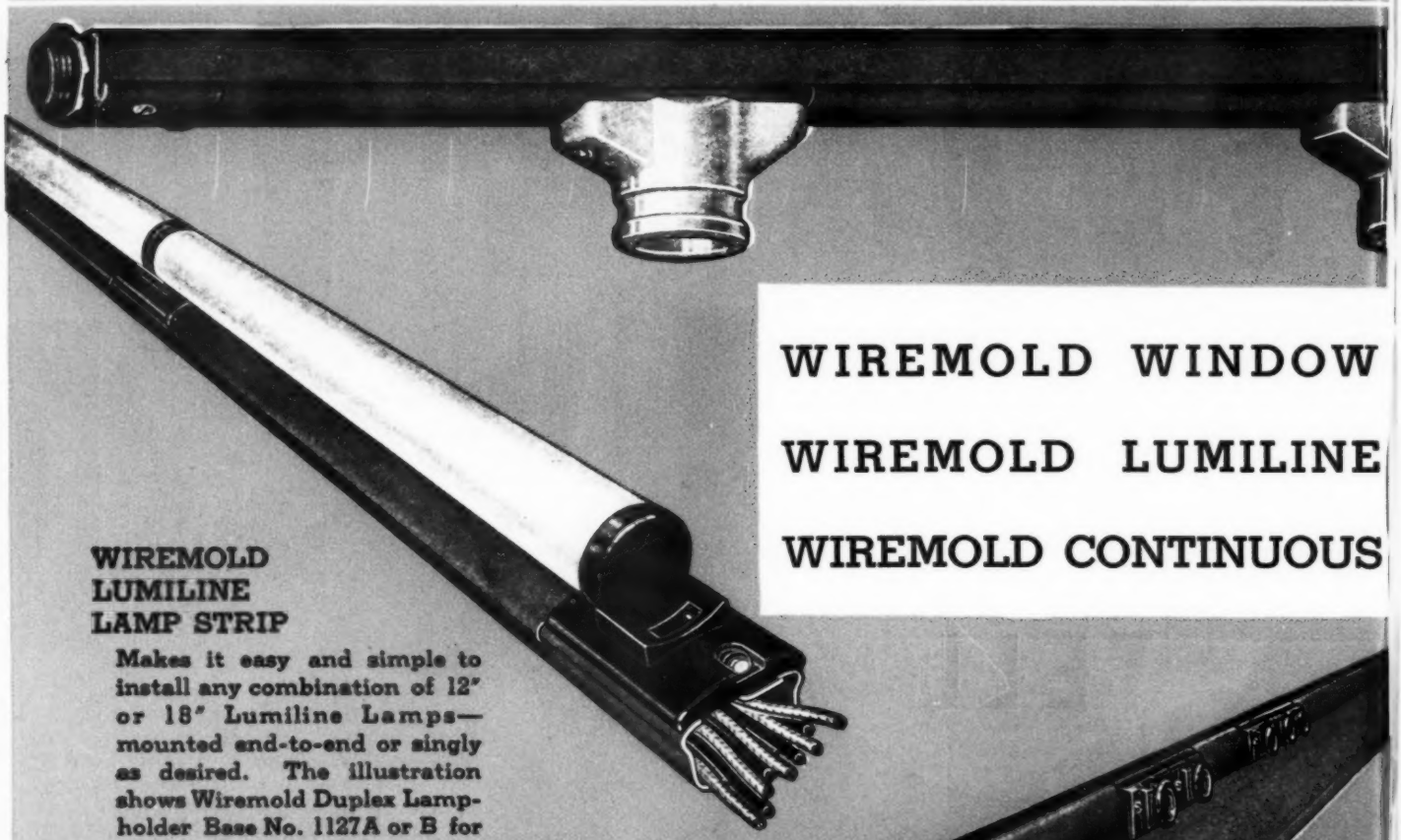
SAFETY SWITCHES



● *The C-H line includes all types and sizes of Standard, Weatherproof and Explosion-Proof Safety Switches, and Range Switches and Service Equipment for every locality— all built to the famous C-H Control Leadership Standards.*

YES! WIREMOLD DOES

FROM PANEL BOX TO OUTLET WIREMOLD MAKES REWIRING EASY



WIREMOLD WINDOW

WIREMOLD LUMILINE

WIREMOLD CONTINUOUS

WIREMOLD LUMILINE LAMP STRIP

Makes it easy and simple to install any combination of 12" or 18" Lumiline Lamps—mounted end-to-end or singly as desired. The illustration shows Wiremold Duplex Lampholder Base No. 1127A or B for end-to-end mounting.

STURDY WIREMOLD OUTLETS

Added as needed—Placed anywhere singly or in groups

No. 1843 Duplex Receptacle

Quick, safe, sure, trouble-proof connection for desk lamps and appliances, etc.

PANCAKE

"FLAT AS A PANCAKE!"

LISTED BY UNDERWRITERS LABORATORIES

HELP CONTRACTORS!

AND OFFERS YOU MANY BUSINESS BOOSTING INNOVATIONS!

AND PANEL STRIP

STRIP & REFLECTOR

OUTLET STRIP

WIREMOLD DIRECTIONAL REFLECTOR

Provides an UNINTERRUPTED REFLECTING SURFACE, extending continuously to any distance. Illustration shows Wiremold Lampholder Base No. 1127 C—a single receptacle for use at end of run—together with 1110 B end fitting.

OUTLET STRIP IS EQUALLY SUITABLE FOR TELEPHONE CIRCUITS

No. 1124
Telephone Outlet

A practical answer to the demand for safe and convenient connections—and uninterrupted service.

"On the floor but not in the way!"

"HALF A HEEL HIGH"
BUT PLENTY OF ROOM FOR
4 No. 12 WIRES

WIREMOLD

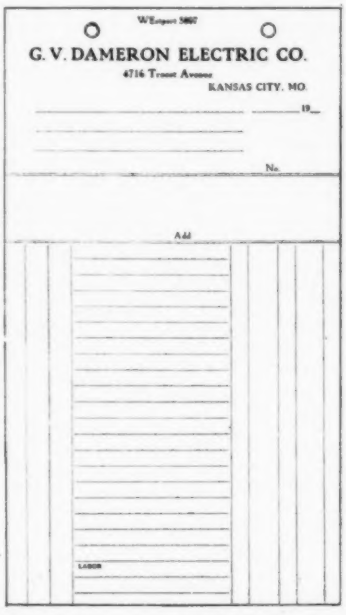
"STRONG AS A BRIDGE!"

boxes in each bay that was to contain motors, it was possible to limit these non-fused tap runs to a length of 25 ft. as required by Section 806d2 of the Code. This rule requires the use of tap conductors having a current carrying capacity of at least one-third the capacity of the feeder conductors.

In making this installation, the Kvalsten Electric Company, Minneapolis, Minn., held its small-wiring to short runs and also provided a layout that would allow motor locations to be changed without requiring extensive alterations to the wiring system. The concealment of feeder conduits was desired to minimize cluttering the ceiling of a new factory building.

Small Job Invoice Form

A printed form is used by the G. V. Dameron Electric Company of Kansas City, Mo., which serves as an office job record, a customer's in-


G. V. DAMERON ELECTRIC CO.
4716 Troost Avenue
KANSAS CITY, MO.
19__
No.
Add
LABOR

voice, and as a material charge and credit requisition. This form is used in duplicate with pencil carbon between a white original and a yellow office copy. Materials that are sent out are listed in lead pencil, the quantities being posted in the left vertical column. Credits are posted in the middle vertical column and the net quantities used are then posted in the adjoining column. The mechanic writes his name and number of hours worked at the bottom of the page. Columns are provided at the right side for unit selling prices and extensions of the materials used. When the invoice is

Two Great Campaigners!

• In Safety Switches

—THE AMAZING NEW Vacu-Break TYPE!

Here's one switch that is really making history in the electrical world. You owe it to yourself to investigate the safest, most efficient, most modern Safety Switch yet created—the VACU-BREAK principle is an exclusive feature of Bull Dog Switches.

The VACU-BREAK principle of circuit rupturing gives a higher degree of safety against arcing and makes possible smaller and more compact cabinets without sacrifice of adequate wiring space.

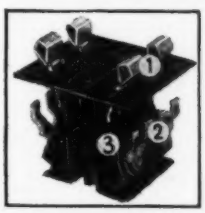
• In Lighting Panels

(Left) **Fuse only type.**

(Below) **Plug fuse and toggle switch type.**

Cartridge fuse and toggle switch type.

The NEW *Improved* BULL DOG SWITCH FUSE CENTERS



Small in Size—Low in Price—Ornamental in Appearance, SWITCH-CENTERS are now available in a Complete Line, ranging from 4 to 40 Circuits. Switch-Centers combining Single Pole and Double Pole Circuits are also available,

1. Redesigned handles provide a fixed pivot. Handles cannot be disengaged from the actuating spring.

2. The moving contacts are furrowed to insure a scraping self-cleaning action and positive gripping contact for better conductivity.

3. Actuating springs now made of pretempered steel, insuring greater uniformity, better alignment and positive action.

BULL DOG ELECTRIC PRODUCTS COMPANY

Manufacturers of Safety Switches, Fusenters, Light and Power Panel Boards, Switchboards, Duct Systems

DETROIT, MICHIGAN

BULL DOG ELECTRIC PRODUCTS OF CANADA, LTD., TORONTO, ONT.

completed, the name and address portion at the top of this form is folded back to fit a standard mailing envelope window. This form is 5½ in. wide and 9½ in. long. Space is provided above the material listing section for the description and address of the job.

This method of handling small jobs saves the time and work of typing invoices, reduces stationery costs, yet provides a complete labor, material and invoice record on one office form. Postings are made to the bookkeeping system from the duplicate forms, after which they are filed numerically according to work order numbers.

Concrete Inserts Save Drilling Costs

New jobs are so laid out by Joseph Newman, Inc., of Jersey City, N. J., that inserts may be placed in the concrete forms to support the hanger

rods for racked feeder conduits. This method saves the cost of drilling the concrete floors later on for through-bolts or for bolt anchors. The elimination of such drillings also reduces the possibility of drilling into concealed branch circuit conduits. When the feeders are correctly routed on the drawings, the inserts can usually be spotted more easily on the concrete form than it is possible to measure off the exact positions of hanger anchors on high ceilings in the poorly lighted areas of unfinished structures. The thirteen feeder conduits that are illustrated are supported with hangers installed on 6-ft. centers. There are four ¾-in. rods and concrete inserts per rack. The horizontal member is 3-in. channel.

WHY TURN LOX is THE ANSWER

BOTH

Lamp and Reflector are detached as ONE UNIT by a slight upward pressure and a quarter turn.

3 POINT BAYONET COUPLING

- Positive lock.
- Immediate connection.
- No prongs or contacts to locate.
- Automatic Polarization.

SELF CLEANING CONTACTS

- Contacts are cleaned as the reflector is turned into hood.

SPIRAL COMPRESSION SPRING

- Insures positive electrical connection.

EASY TO WIRE

- Nothing in way or hard to reach.
- No screws to remove.

to the problem of maintaining RLM Efficiency Standards

RLM stands for certain high standards of illuminating efficiency which are certified by the Electrical Testing Laboratories of New York to be met by all products bearing this label.

Dirty reflectors which waste from 20% to 80% of their RLM efficiency are a challenge to the electrical industry which can only be met by providing installations which encourage frequent lamp and reflector cleaning...

TURNLOX is Benjamin's answer to the challenge... an answer that gives further evidence of Benjamin's leadership. This unique and exclusive Benjamin construction encourages frequent cleaning because it reduces maintenance costs and simplifies cleaning and inspection. Illustrated on this page are the salient features which have made TURNLOX, the industry's outstanding answer to the maintenance problem. Your inquiry for complete details and data on all types of Benjamin Reflectors which are furnished with TURNLOX hoods, is cordially invited.

BENJAMIN TRADE MARK

BENJAMIN ELECTRIC MFG. CO.
Dep't EC, Des Plaines, Ill.

Send me complete details on TURNLOX.

(Print name and address below)

A DEPENDABLE G-E TAPE FOR EVERY ELECTRICAL REQUIREMENT

Varnished Cloth Tapes . Cotton Tapes . Asbestos Tapes . Friction Tapes
Rubber Tapes . Weatherproof Binding Tape . Varnished Silk Tape

A complete line of superior tapes built to meet exacting requirements . . . You can now obtain them from your nearest G-E Merchandise Distributor.

GENERAL ELECTRIC

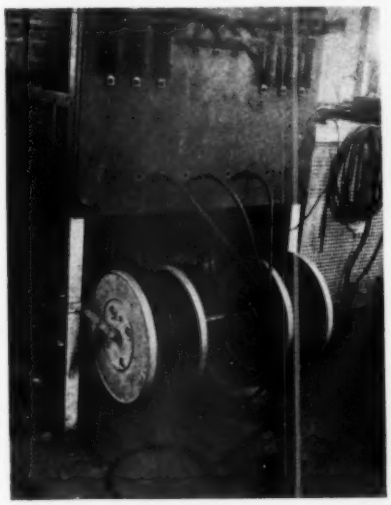
INSULATING MATERIALS

APPLIANCE AND MERCHANDISE DEPT., GENERAL ELECTRIC COMPANY, BRIDGEPORT, CONNECTICUT

Service Shop . . . Practice . . . . .

Front-of-Board Reels for Test Cables

Heavy flexible cables for shop tests are stored on reels in front of the testing switchboard when not in use, at the Excel Service Company, Chicago, Ill. Each set of cables is provided with a 16-in. diameter, 8-in. wide spool or reel that may be re-



volved upon shafting that is bracketted to the face of the switchboard frame. Special flush plug-in jacks similar to those on the switchboard panel were installed on the outside face of each reel. Single-conductor flexible cable jumpers are used to make connections between the multi-conductor test cables and their plug-in jacks, and to the desired source of current that is available at different switchboard jacks.

Stoker Maintenance Service

Stoker maintenance work is solicited as fill-in business during the slack summer season by the Brunswick Electric Company of Chicago, Ill. Letters are sent to the owners of stokers in cooperation with the manufacturer or agent of the stoker equipment that is in use offering between June 1 and October 1 the following service at a flat rate:

MOTORS: Dismantle and thoroughly clean them. Paint windings with air drying insulating varnish. Adjust brush throwout mechanism. Install new thrust washers and brushes where necessary.

CONTROLS: Thoroughly clean and adjust internal parts of starters and automatic controls.

STOKER: Clean out retort, check screw for wear. Clean out wind box (where removal of dead plate is unnecessary). Seal all leaks where not more than 15 lbs. of high temperature cement or 50 lbs. of refractory materials is needed. Clean gear case and change oil. Paint inside of hopper with rust resisting paint.

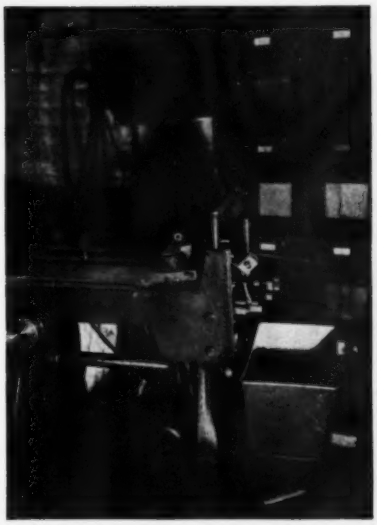
If an inspection discloses a need for additional parts or service, a detailed quotation is submitted to cover what is required.

Sawdust Bath for Oil Removal

Because of the success that is experienced with sawdust for soaking up pools of oil from shop floors, the same principle is being applied very economically in motor service shops for the quick removal of oil and light grease from the surface of motor parts. A metal container, such as a wash tub or steel drum, is kept partially filled with fine sawdust. The part to be cleaned is shoved into the container and is then given a quick covering and rub-down with handfuls of sawdust. After a brushing off with the hands, the surface will be found reasonably well cleaned. The remaining particles of sawdust can then be quickly blown off the metal and out of crevices with air pressure. Because of the length of time the sawdust will continue to absorb oil before it must be replaced, there is said to be considerable economy in comparison with the use of waste or purchased rags.

Machine Production for Cell Insulation

Top sticks and in-between sticks varying from .030-in. fish paper up



Top stick cutter

to 3/32-in. fibre, and ranging from ¼-in. to 1-in. wide are cut with extreme accuracy on an automatic-feed motorized shear. Crimped slot-closing sticks are formed into correct shape with an automatic-feed electrically heated forming machine. Both machines were designed and constructed by the A. C. Motor Service Company of Jersey City, N. J.

The cutter is adjustable to accommodate material up to 7-in. wide, and has a bed plate feed that permits strips 5-ft. in length being cut into whatever stick widths are desired.

Former and crimper

The knife or shear is operated through a worm and gear, driving a cam rod, this mechanism being interlocked with stop-plates and the feeding fingers. A counting device is also provided. Uniform widths of evenly cut material are claimed to be produced with this cutter in considerably less time than with hand cutting methods.

The forming-crimping machine is also motor operated. Single flat pieces of fish paper are fed automatically from a hopper into position over an electrically-heated forming slot of smooth steel. A cam-driven, rounded-face steel blade shoves the paper downward into this heated slot, from which the evenly formed sticks fall to a tote box. The depth of the heated slot through which the formed materials must pass causes them to retain a permanent U-shape.

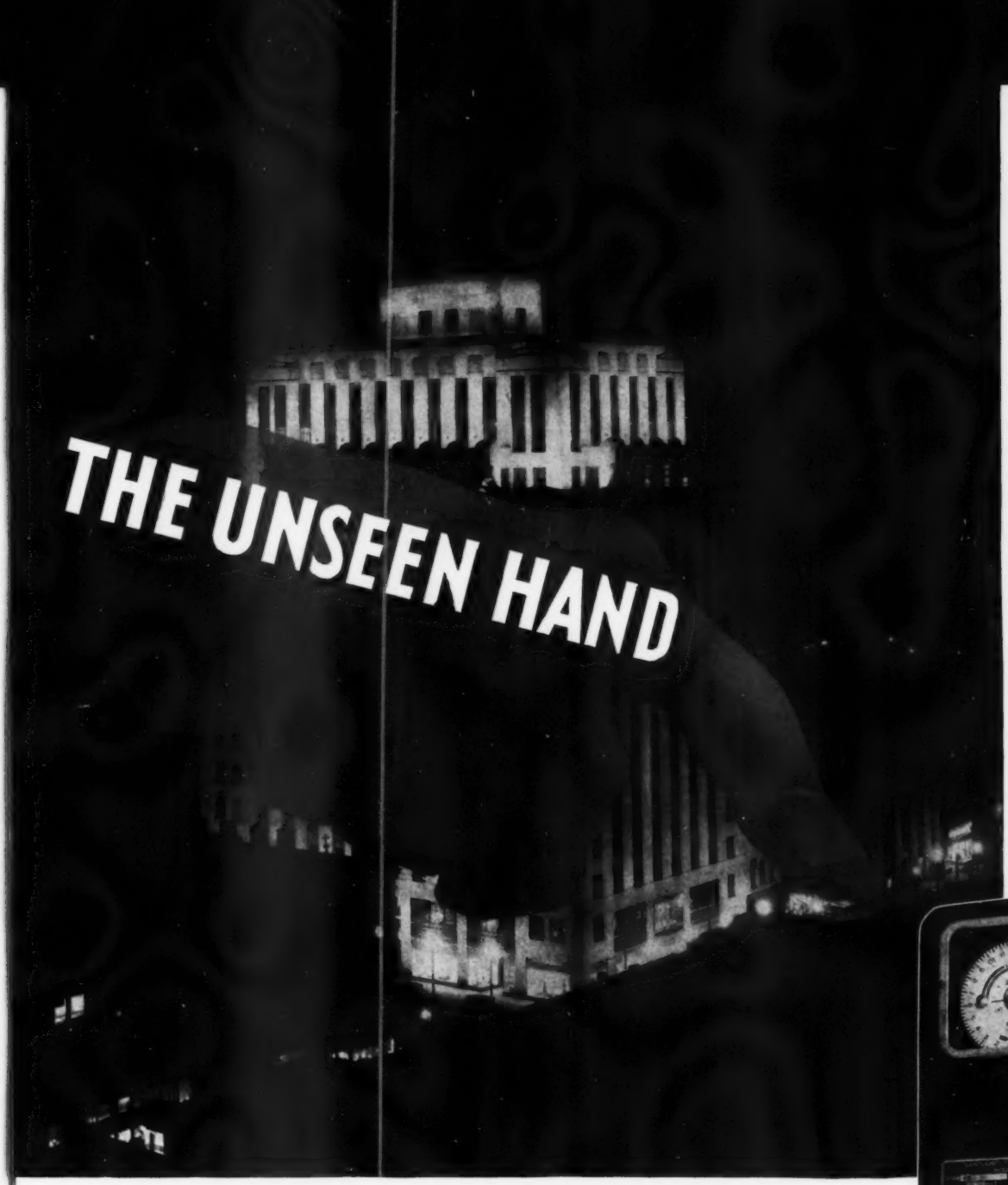
Space-Saving Motor Display

Quick selections may be made from among the compact stock of 250 or more medium-size motors that are massed for display on the

sales floor of the Consolidated Electric Motor Repair Company, New York, N. Y. Steel supports and plank shelves were held close to the wall, to provide a 6-shelf, 33-ft. long rack which slopes back to the wall at the upper end. Motors in sizes ranging from 1/6 to 25 hp., are graduated in size from top to bottom as the shelf width and height varies. Shelves are never loaded two-deep with motors because of the disadvantages in having hidden or obscured stock, and because of having to move a motor placed in front of one that may be wanted. Racks and wall braces were made of 2-in. L-iron spaced about 5 ft., 6 in. apart, the shelves varying from 24 in. to 11 in. vertically.

Safety Barrier for Hatchways

An L-shaped steel trap door or hatch which hinges at the intersection of its two steel floor plates prevents the possibility of open hoist



...that makes this installation COMPLETELY AUTOMATIC

TURNING "on" and "off" the flood lights of a building is done *automatically*—more dependably—more economically—when a Sangamo Time-Switch does it. The everpresent inconsistencies of manual operation are completely eliminated.

But . . . you must *first* sell the building manager on the merits of this unseen hand. Thus, you will gain not only the immediate profit on the switch and its installation, but also his future goodwill for other electrical work. The attention-free performance of the Sangamo Time-Switch will see to that!

SANGAMO TIME-SWITCHES for

Display Window Lighting | **Industrial Lighting** | **Apartment House Lighting**
Floodlighting Control | **Electric Signs** | **Motor Control**

and many other applications where **COMPLETELY** automatic control is desired

Sangamo Form VSZ Synchronous Motor Time-Switch with astronomic dial for changing automatically "on" and "off" operations in accordance with sunset and sunrise.

SANGAMO ELECTRIC COMPANY SPRINGFIELD ILLINOIS

well accidents. When equipment is picked up on the first floor and is hoisted up through an opening in the second floor, this opening or hoisting well remains completely guarded on all sides. To open this hatch, the two-member assembly is tipped back, causing one deck plate to rest flat on the shop floor, while its companion plate raises to a vertical position as a section of the guard rail. Workmen who operate

the hoist may work at any position without the hazard of becoming over-balanced and falling to the lower floor. The overhead hoist monorail which leads to various parts of the second floor has a safety catch and pull cord release which locks the hoist in the center of the hoist well while equipment is being raised or lowered. This equipment was designed by the A. C. Motor Service Company of Jersey City, N. J. Its winding department was located on the second floor to isolate such work from the machine shop and cleaning departments.

Stock-Finding Display Boards

A trend in motor service shops is to provide display racks or sample boards of sleeve bearings, brushes, and other miscellaneous parts to speed up over-the-counter service. Because each class of material often involves the display of one hundred or more pieces, a key-numbered label that designates a similarly numbered stock-bin or drawer which contains a particular item has been found helpful. When an item has been selected on the display board the counter-man merely reads the bin number on the label, and the item is supplied quickly from the stockroom.

Creating more Industrial

Not just new work, but the modernization of present installations as well

Nine out of ten factories are inadequately wired. That's fact, not fiction. Here is a huge, almost untouched market for electrical jobbers and contractors. Here's a chance to get real business.

And new industrial wiring jobs are available, too. New factories are going up . . . and plans for others are being completed almost daily.

We see eye-to-eye with NECA

Anaconda's new sales program ties in with NECA thinking about adequate wiring and its promotion. A sincere and convincing advertising campaign to industrials will help you sell adequate industrial wiring. The ads appear in *Time*, *Business Week*, *Factory* and six other magazines that are widely read by executives.

The keynote of Anaconda's new wiring promotion is ADEQUACY! Each and every advertisement points out the need for correct wiring ...and shows how adequate wiring saves money and adds to profits.

Then . . . backing this advertising . . . are effective promotional helps. They are all yours to use to aid in selling.

With our advertising and merchandising to support your selling, you'll find it easier to get industrial wiring jobs this fall. To give customers the best value, recommend and install time-tested products made by Anaconda Wire & Cable Company. Remember . . . Anaconda offers a *complete line* of high-grade wire and cable products to meet every electrical need.

• • •

This book contains complete information about Anaconda's new program to promote the sale of adequate wiring. It also makes suggestions for its effective use. You will be interested in reading this book. Send for it.

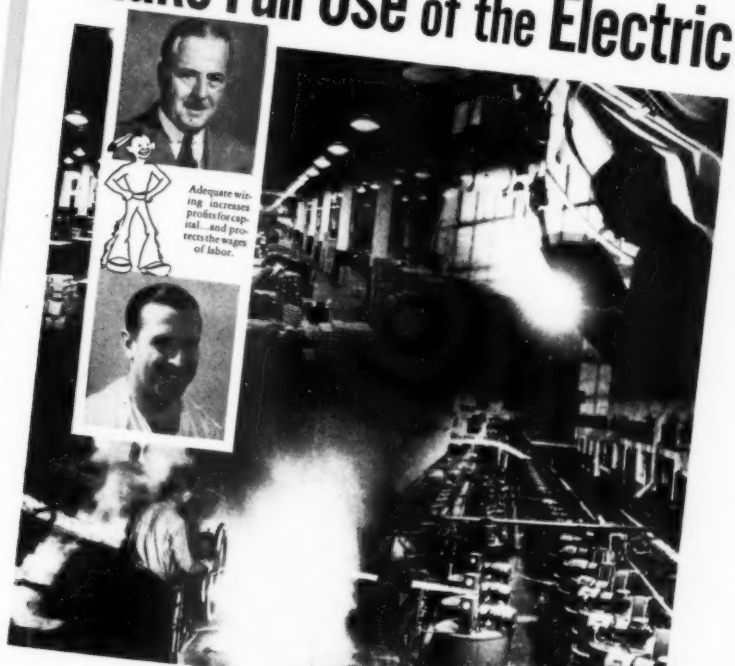
ANACONDA
from mine to consumer

Anaconda Wire

Wiring Jobs for You....

This and similar advertisements to promote the greater use of adequate wiring will appear regularly in these widely-read magazines...*Time, Business Week, Factory Management and Maintenance, Automotive Industries, Steel, Textile World, Chemical and Metallurgical Engineering* and *Coal Age*.

Make Full Use of the Electric Power You Buy...



In 9 out of 10 factories, losses are incurred daily by the inefficient use of Electric Power. And most of this loss is needless. Let us show you how to stop wasting power!

EVERY industrial executive recognizes the value of electric power. But every executive is not getting full value from the electric power he pays for. There is one big reason . . . *Inadequate Wiring.*

Losses the books never record

Losses due to poor wiring do not always show up on the books. They are caused by interrupted production which often results in loss of materials in process. By unsatisfactory performance of equipment due to voltage drops from "overloaded" wiring. By excessive maintenance costs, high insurance rates, preventable accidents. By wages paid during outages. And by the dissipation of current as heat rather than useful power.

Consider your own plant! The odds are 9-to-1 that you are suffering losses through inadequate wiring. And it costs you nothing to have your wiring system inspected . . . to make sure that improper wiring is not holding your profits down.

Anaconda can help you make full use of the electric power you buy. Our engineers have had a wide experience with industrial wiring problems. Write us, at 25 Broadway, New York. When your specific problem requires engineering attention, we will cooperate with your own plant engineer without obligation to you.

What adequate electrical wiring does for you

1. Assures uninterrupted service
2. Prevents voltage drops from "overloading"
3. Permits more convenient location of equipment
4. Reduces maintenance and repair costs
5. Prevents loss of power in form of heat
6. Increases the safety factor, lowers insurance rates

Shop Talk. Satisfactory solution to the multiplicity of cable problems can best be assured by careful selection of the proper combination of conductor sizes, insulation, protective covering and finish.

Anaconda manufactures a complete line of wires and cables for all uses. A few examples follow: transmission and distribution . . . industrial, mining, transportation . . . commercial and residential construction . . . wires and cables for use in manufacture of electrical apparatus and appliances.

"DURACODE," one of the large family of Anaconda products, is designed to serve industry economically where conditions are unusually severe. Is highly resistant to moisture, acids and alkalies, offers low susceptibility to combustion and explosion.

ANACONDA
from mine to consumer

Anaconda Wire & Cable Company

General Offices: 25 BROADWAY, NEW YORK • Chicago Office: 20 NORTH WACKER DRIVE • *Sales Offices in Principal Cities*

Anaconda Wire & Cable Company

General Offices: 25 Broadway, New York
Chicago Office: 20 North Wacker Drive
Sales Offices in Principal Cities

Code Chats . . . . .

Questions and answers relating to the interpretation of the National Electrical Code . . .

Conducted by F. N. M. Squires

Chief Inspector New York Board of Fire Underwriters

Compensator Not a Switch

Why is a compensator not considered a motor circuit switch?

Because of the frequent need of making repairs to compensators it is deemed advisable to have a disconnecting means ahead of the compensator, hence the requirement.

Receptacle Out-of-Doors

If a gem switch box is installed in a cabinet box, and a flush receptacle is used in the switch box with a regular receptacle plate, would this be considered weatherproof?

The use of a non-weatherproof type of receptacle and receptacle box within another larger enclosing non-weatherproof box, would still not make an acceptable job. A weatherproof type of receptacle should be used.

Outdoor Boxes

Under special conditions can a shallow ceiling box be used under and around the edge of a gas station store canopy? The regular 4-in. box cannot be used here because if connectors are used in outside K.O. cable will show. The cable cannot be run into the back K.O. without connectors, which would mean holes cut in joists and owner objects to cutting holes. These little grey ceiling boxes look good. The porcelain fixture fits tight on the box and there are no holes in side of box as there would be in the use of the regular 4-in. box. Why will these boxes not be considered as weatherproof?

If our correspondent by "these little grey ceiling boxes" means the old cast stud box or plate, he should remember that these have not been approved for several years, nor are they considered weatherproof. Some inspector bureaus might not consider the layout described above as such a one as to require weatherproof location if so located as not to be exposed to rain. While the boxes and lamp holders may not be directly exposed to the rain, they would be subject to fog and mist and therefore to moisture. Therefore, if it is desired to employ any other than a weatherproof type of work, the inspection department having jurisdiction should be appealed to for special permission.

Permanently Connected Appliances

What are considered permanently connected appliances in rules 2004-5? It does not seem that they could be ranges or water heaters.

Water heaters are practically always permanently connected due to the connections of the waterpipes.

Ranges, because of their size and weight are not apt to be moved very much and may be direct connected in a permanent manner. Also they may be connected as a portable by means of a flexible cable and attachment plug.

It is, of course, to be recommended that all range frames be grounded.

Master Switch for Burglar Lights

Please advise me of the correct way to install a master switch to be controlled from two places by remote control. I mean one that would be used in case of a burglary to turn on all the lights (9 rooms). For your information, we use here a three-wire grounded neutral system with only the hot sides fused.

There are two ways in which this might be done:

First: A nine point remote controlled magnetic contactor could be employed. This could be controlled from two or more points, such as the master's bedroom, etc. Then a two-wire line could be run from each of the 9 switches throughout the house to this contactor and one point (switch) of the contactor connected in parallel with each of the 9 house-switches. Then, when the remote control switch is pushed, all of the lights in the house will be lighted.

Or second; a separate lighting system with a light in each room can be installed with a three-way switch at each of the two desired control points. This system would be independent of the regular house lighting and probably would not need to supply full illumination throughout the house.

Service Entrance Cable For Range

Rule 513-a states that a service entrance cable with a bare neutral can be used to wire ranges if the outer covering of cable is non-metallic.

Type SE has an armor next to the bare neutral. but the outer covering is braid.

I was told by a jobber that this would not be allowed. What is your opinion?

Yes, type SE cable having the final covering non-metallic, that is, with an outer final braid, is permitted by the Code to be used for range circuit work.

Motor Protective Device

In Section 808-b, Exception 1, on group motor protections, it speaks of special motor running protective devices approved for a single branch circuit and omitting the branch circuit protective fuses and using a heavy fuse to protect the feeder. It seems the supply houses are not so familiar here with the exact nature of this protection and we are unable to secure them, even one of the inspectors here could get no satisfaction on the subject. I would appreciate information on such a product.

In the 1935 Code, Exception 1 of Rule 808-b-2 mention is made of "a motor-running protective device which has been approved for group installation." These devices are known in the motor industry as "thermal cutouts" or "thermal relays."

The thermal-cutout is a time lag fuse which will pass a relatively large inrush current for a short period of

time, but will open the circuit when its capacity is exceeded for a period of time long enough to overheat a motor. A thermal cutout of proper capacity will, therefore, protect a motor against overcurrent. In operation, this device, being a fuse, has its operating member destroyed the same as a fuse.

The thermal relay operates mechanically by tripping out a contact through the bending of the thermal unit from the effects of the current passing through it.

Both of these thermal devices, being slow in their action will not operate successfully on short circuits and, therefore, must be protected by fuses, or instantaneous circuit-breakers which, according to 805-c, shall have ratings not in excess of four times the ratings of the full load currents of the motors to be protected. In group installation the protecting fuse or circuit-breaker protecting the thermal device shall not be larger than that required for the smallest thermal device in the group. The ratings of the fuses required are shown on the thermal device or its enclosure.

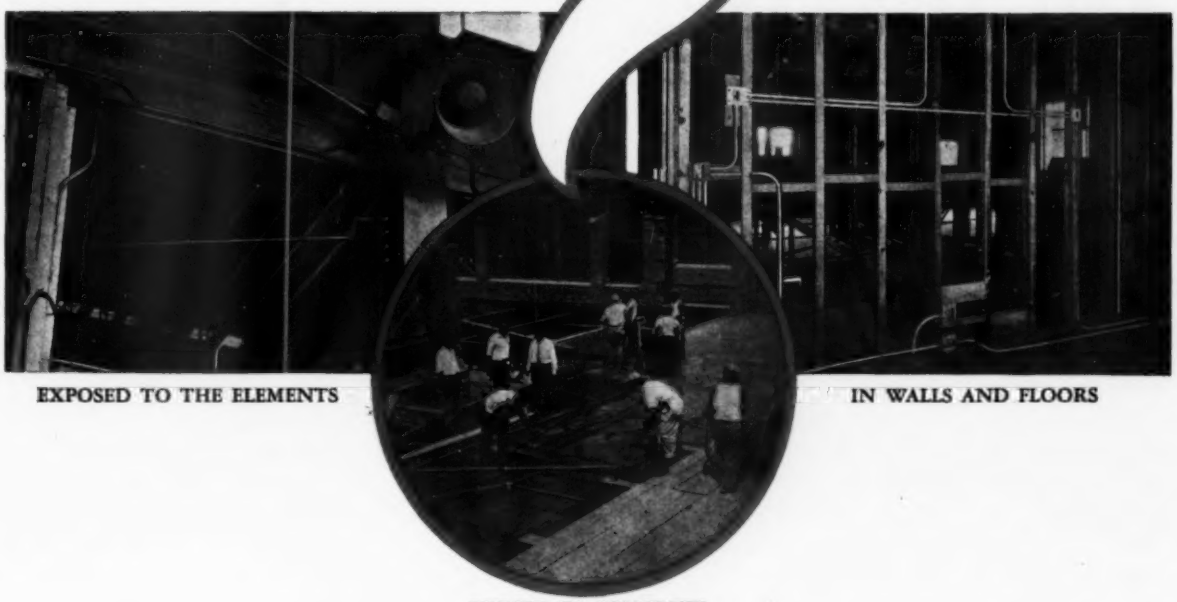
Range Grounding With Entrance Cable

Section 908f of the Code states that the grounded circuit conductor of an interior wiring system shall not be used to ground equipment. Is it permissible to ground a range frame to the metal armor of an approved bare neutral entrance cable used for range feeder? The armor in this cable is in contact with the bare neutral conductor throughout the cable but there is an insulating braid over all and the neutral is grounded to the water main.

In this column we have repeatedly said that range frames should not be grounded to the neutral of the range circuit and have quoted rule 908-c as our authority. We still maintain the same stand.

There might, however, be a fine technical point raised that the range frame could be grounded by means of the armor of an armored entrance cable although such armor is in contact throughout its length with the neutral conductor. We believe, though, that this would still violate 908-f inasmuch as such a connection would provide an electrical connection between the range frame and the neutral conductor of the interior wiring system.

How long will the wiring system last?



EXPOSED TO THE ELEMENTS

IN WALLS AND FLOORS

BURIED IN CONCRETE

YOU CAN ELIMINATE THIS UNCERTAINTY WITH

ELECTRUNITE Steeltubes

REG. U.S. PAT. OFF.

KNURLED INSIDE SURFACE
Patent No. 1,962,876

KNURLED INSIDE FINISH AVAILABLE IN ½", ¾" AND 1" SIZES

• Bury it in concrete, expose it to the elements, install it in partitions—ELECTRUNITE Steeltubes provides positive wiring protection for the life of the structure.

Genuine ELECTRUNITE Steeltubes resists rust and corrosion at every point. Its protective zinc coating, applied by an exclusive electrical method, is uniform—not heavy at one point nor thin at another—smooth, tight and will not flake or crack at bends. Furthermore, elimination of threads removes the possibility of corrosion gaining a foothold at boxes and connections. No wrenches, dies or vices are permitted to touch the tube—thus protecting the zinc coating from possible injury.

Genuine ELECTRUNITE Steeltubes is light in weight—yet unusually strong. It is easy to handle and to install. Three simple fittings adapt it to any job. It takes up less space in walls and floors. Its patented knurled inside surface makes wire pulling easier. And it is fully approved for most every type of construction.

Genuine ELECTRUNITE Steeltubes will help you obtain more contracts that show profits. It will bring repeat business, too. Ask your wholesaler for figures, see Sweet's or write us.

SUBSIDIARY OF
REPUBLIC STEEL CORPORATION

Electrical Division

Steel and Tubes *Inc.*

WORLD'S LARGEST PRODUCER OF ELECTRICALLY WELDED TUBING

CLEVELAND . . . OHIO

ELECTRICAL CONTRACTING

S. B. WILLIAMS, Editor

New Code Arrangement

THE rearranged National Electrical Code, which is to be finally adopted by the Electrical Committee, N.F.P.A., next year as the 1937 edition, has undergone an intensive study by the several sections of the International Association of Electrical Inspectors and reports were made at the several sectional meetings last month. While many questions were raised and suggestions offered, it is remarkable how few errors were pointed out considering that the work of preparing the preliminary draft was all done within a period of less than a year.

The new code, while it has rearranged and simplified the matter in the present edition, has left out practically nothing of any importance. The meaning also has been left intact.

There will, of course, be considerable confusion when the new code comes into general use a year from now because members of the industry have become accustomed to the present arrangement. The general correlation of material, however, is expected to make the new code much easier to use and understand once people get used to using it.

—◈—

Ganged Switch Control

ONE of the important elements in adequate wiring of residences to which more attention must be given is switch control. As the number of lighting effects increases, the need for more switches grows, piling up the number in one gang. In two houses recently completed, this became a real problem. One was a demonstration house where an unusually large number of controls was required to show the effects of different types of lighting and the application of appliances and wiring conveniences, but the other was a house built by the owner for his own use.

This multiplicity of switch control for one-way, two-way, three-way, remote and master switching makes it difficult for the operator to select the right switch, places large gang plates on walls and introduces the problem of wiring space in ganged boxes. The new small devices have helped considerably to improve the appearance of ganged switches but, when seven or eight or more switches are ganged in one place, there are more problems than appearance.

It will be some time, of course, before this problem will arise in a substantial number of homes, but in the meantime there will be an increasing number of homes making use of the newer forms of lighting and wiring conveniences. They offer an opportunity to try out ideas for the ganging of switches in an inconspicuous manner and in such a way as to reduce the confusion of switching to a minimum.

—◈—

Higher Labor Costs

ELSEWHERE in this issue will be found the results of a study of the present supply of electrical construction labor. One thing stands out definitely and that is that labor costs are surely going to go higher.

Even in the cities where there is a supply of labor still available, there is a scarcity of good men. The good men are the most inexpensive mechanics. They do their work quickly and well. They make very few mistakes that have to be corrected. They need very little supervision, if any. They know what to do and, therefore, have very little lost motion.

The available supply of labor today is of a fair to poor grade with the result that more supervision is needed, work is slower, more mistakes are made, and job efficiency is generally decreased. All of this makes for higher unit labor costs.

Another point which must be considered is the advancing age of mechanics. We have had virtually no new blood in a number of years. The men who were first-class mechanics before the depression are for the most part now past forty. The physical demands of new construction will more and more slow these men down.

This situation of labor costs can generally be

expected to become worse until some effort is made to rebuild the ranks with an adequate supply of helpers. It is introducing another element of uncertainty or gamble to which consideration must be given when making up estimates.

—◇—

Used Material

A SUBSTANTIAL market for used wiring material has sprung up as the result of the wrecking of so many old buildings during the past few years. Wire, conduit and fittings, switches, cabinets and similar materials are cleaned up, painted and offered for sale at a considerably lower price than new material.

Since the material is sold in areas having electrical inspection, is it accepted by the inspectors or does it get into work for which no permit is taken out? Even though the material when new might have borne the Underwriters' Laboratories label, it cannot be offered for sale as approved material after years of hard use have taken their toll of wear and tear. How then does it pass inspection, if it does? Is it that after cleaning and painting one cannot tell it from new material?

Undoubtedly much of it is used in remodelling work where it is permissible to reuse material that was part of the original job. In such cases, the inspector, of course, would not know which was salvaged from the job and which was purchased from a used material dealer.

Wiring material that has gone through the wear and tear of use for some years has suffered deterioration and certainly is not as strong or safe as new material. Then to put this material through all of the rough handling received in building wrecking and expect it to give good safe electrical service does not seem to be consistent or even in line with the code policy of minimum safety.

Because of its safety requirements, electrical wiring material cannot be considered in the same category as other building supplies such as bricks, wood, window sash, etc. These used materials are used again in temporary or short life construction or in additions and repairs where the element of first cost is of prime importance and where there is no particular hazard. Used electrical material, on the other hand, is used in exactly the same manner as new material and subjected to exactly the same load conditions. Surely this difference must be recognized.

There are, of course, certain used electrical products which can be reconditioned and made to operate satisfactorily but this is not true of most wiring supplies. In fact those that can be reclaimed to give safe use do not as a rule offer a sufficient price differential over new and modern materials to make their purchase attractive.

This problem of used wiring materials is worth studying so that their use can be kept within reasonable bounds of safety.

—◇—

Adequate Wiring Promotion

THE Handbook of Wiring Design which has been compiled by a joint committee representing the entire organized electrical industry, is now ready for the press and should be available within a few weeks. Its publication is hoped to be the signal for a general drive to promote adequate wiring.

From the standpoint of business, employment security and more extended opportunity for all branches of the industry, there is nothing as important as adequate wiring promotion. In this issue we have made an audit of the economics of adequate wiring which shows what it means to every branch of the industry, what the selling factors are, and how costly inadequate wiring really is.

The facts show that one thing and one thing only will establish adequate wiring and that is industry promotion—selling. We can bring out more and more new methods, we can cut the price still further, we can publish a fine set of standards and specifications, but until we have the right kind of promotion, adequate wiring will continue to remain a hope.

Before we can sell the public, the industry itself must be sold. In spite of the benefits to be gained by all, there is a large job ahead just to convince the industry and its employees of the need and then to educate them how to proceed. This is not a job that can be done by any one group. It must be done by all. Nor is it a job that can be plunged into quickly. It must be studied so that all efforts can be coordinated. Such a study should be going forward now and it is to be hoped that the new handbook may be the signal for the work to begin.

N.E.C.A. News..

Material for this department is supplied by the headquarters staff of the

National Electrical Contractors Association

420 Lexington Avenue, New York, N. Y.

President	Vice President	General Manager
E. N. Peak	Louis Kalischer	Laurence W. Davis
1003 West Main St.	17 Bergen St.	420 Lexington Avenue
Marshalltown, Ia.	Brooklyn, N. Y.	New York, N. Y.

34th Annual Convention Program

Atlanta Biltmore Hotel, Atlanta, Ga.
October 12-14, 1936.

Monday, October 12

Address of Welcome—*J. M. Clayton, Chairman, Atlanta Convention Committee.*

Response—Louis Kalischer, *Vice-President, N.E.C.A., Brooklyn, N. Y.*

President's Address—*Earl N. Peak, Marshalltown, Ia.*

Secretary-Treasurer's Report—*Laurence W. Davis, New York, N. Y.*

"New Horizons in Lighting"—*Samuel G. Hibben, Director of Applied Lighting, Westinghouse Lamp Company, Bloomfield, N. J.*

Report of Highway Crossings Signals Committee—*J. W. Collins, Chairman, Chicago, Ill.*

"Building Economic Trade Relations"—*R. M. Walker, Chairman, N.E.C.A. Distribution Committee, Atlanta, Ga.*

"The Contractors' Competitive Behavior and Their Responsibility to the Public"—*R. A. Goeller, President, New York Electrical Contractors' Association, Inc., New York N. Y.*

REPORTS ON ORGANIZATION ACTIVITIES

K. D. White, Vice-President, Georgia Electrical Contractors Association, Columbus, Ga.

J. J. Newitt, Secretary, Los Angeles, Calif.; Presenting paper prepared by A. L. Stone, President, Southern California Chapter, N.E.C.A.

Floyd A. Wallace, State Manager, Iowa Association of Electrical Contractor-Dealers, Des Moines, Ia.

R. H. Bouligny, Treasurer, Carolinas' Association of Electrical Contractors, Charlotte, N. C.

Entertainment.

Ladies' Luncheon — Brookhaven Club

Drive through residential section of Atlanta

Dance.

Tuesday, October 13

"The Most Important Tool on the Job"—*George W. Patterson, Chairman, N.E.C.A. Cost Data Committee, Toronto, Ont.*

"Simplified Accounting"—*L. W. Davis, General Manager, N.E.C.A.*

"The Contractors' Viewpoint of Industry Distribution Problems"—*Joseph C. Fitts, Secretary, Heating, Piping & Air Conditioning Contractors' National Association, New York, N. Y.*

"Some Thoughts on the Building of N.E.C.A."—*T. W. Wilmer, Chewning & Wilmer, Inc., Richmond, Va.*

"Adequately Financing the National Association"—*A. Lincoln Bush, Belmont Electric Co., Inc., New York, N. Y.*

"Contractor - Dealer Merchandising School"—*J. J. Caddigan, Edison Electric Illuminating Co., Boston, Mass.*

"Let There Be Outlets"—*Playlet written and directed by J. W. Collins, Secretary, Electrical Contractors Association of Chicago. Members of cast: Eleanor Clarkson, Thomas Domville, J. W. Collins.*

"Getting Adequate Wiring Into Homes"—*O. R. Hogue, Commonwealth Edison Company, Chicago, Ill.*

"A More Profitable Use and Understanding of the National Electrical Code"—*George Andrae, N.E.C.A. Representative, Electrical Committee, N.F.P.A., Milwaukee, Wis.*

"Are Motor Dealers and the Small Repair Shops Resigned to Fate?"—*J. R. Stolzenbach, Chairman, National Motor Section, N.E.C.A., Baltimore, Md.*

Discussion of motor distribution problems by motor specialists.

Selection of Chairman of National Motor Section for ensuing year.

Entertainment.

Ladies' Luncheon—Druid Hills Golf Club

Ladies drive to Stone Mountain Memorial and Cyclorama at Grant Park

Banquet, Entertainment, Dance.

Wednesday, October 14

"Electrical Merchandising by Electrical Contractors"—*J. M. Richardson, Richardson-Wayland Electrical Corp., Roanoke, Va.*

"The Electrical Industry—A Formula for Progress"—*C. E. Swartzbaugh, Vice-Chairman, Electrical Industry Promotion Committee, Toledo, Ohio.*

Action upon proposed amendments and re-arrangement of Constitution and By-Laws.

Election of Executive Committeemen.

Entertainment.

Luncheon, Golf and Bridge in the afternoon and Southern Barbecue and Special Features in the evening at East Lake Golf Club.

"RED FLAME" CONTEST:—More than 50 persons competed in preparing written reports of electrical violations that had been pre-arranged in the skeleton-wired "Red Flame House", a feature of the Eastern Section, I.A.E.I. convention, held in New York on September 8 to 10. Contestants were limited to a half-hour for viewing the wiring arrangement and for preparing their report. An array of wiring, fixtures, appliances, motors, and service equipment had been so installed in one large room that over 300 Code violations existed. Active and associate members of I.A.E.I. alike were eligible and separate testimonials on parchment were awarded to the best report submitted from each group. The second-prize winners received honorable mention. Printed forms were used for the contest which contained headings to designate the various sections of the display that were covered in each report. Each complete report was filed without identification in a sealed envelope, together with the stub from a numbered identification coupon. Contest judges, therefore, learned only the identity of those to whom prizes were awarded. First prizes were awarded to George Steinhardt, active member, an electrical inspector for the New York Board of Fire Underwriters; and Al Bonahur, associate member, vice-president of the S. J. O'Brien Sales Corp., an electrical contracting, service and sales organization of New York, N. Y.

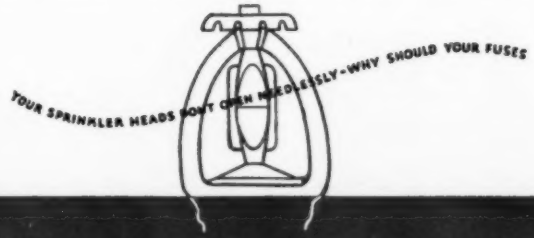
"We Reduced our

"Sounds too Good to be True but it's a Fact"

Says Mr. A. E. Shorten, Chief Electrician of John T. Lewis Company, Philadelphia, Pa.

HERE ARE THE FACTS—

"We were having a shutdown about every four days in our lead drying department due to blowing of 60 ampere fuses. Each one cost us good money in lost production and idle men. We changed to BUSS Super-Lag fuses—since then (May 23, 1935) we have had only two fuses blow—a reduction in shutdowns of about 92%."



Fuse Blows-92%

with fuses MADE TO *protect* .. NOT TO BLOW

——YOU TOO CAN *Prevent the* RECURRING SHUTDOWNS *caused by* NEEDLESS BLOWS!

It may come as a surprise to some executives that many equipment shutdowns supposed to be caused by trouble in the circuit, really originate in the protective devices themselves.

To prevent such costly waste—caused by protective devices opening needlessly—BUSS developed Super-Lag fuses.

If you are even remotely interested in plant operation you will find it well worth while to inform yourself as to . . .

WHY BUSS FUSES DON'T BLOW NEEDLESSLY

10 Features and the **Super-Lag**

in the design of the FUSE-CASE help make it possible . . . .

development in the FUSE LINK completes the job.

GET THE FACTS

You will find this new book on fuses of refreshing interest.

It sets up in concise, fast reading style, the facts about fuses and their relation to the cost of plant operation.

It will give you authoritative information that will be valuable to you in any discussion of fuses or any feature of the problem of electrical protection.

Your name and address will bring you a free copy. Just ask for the Rb book on "Fuses made to protect—not to blow."

BUSSMANN MFG. CO.
University at Jefferson
St. Louis, Mo.

Division of McGraw Electric Co.

BUSS super-lag FUSES

Contracting . . . . News . . . . . .

Labor Appoints Arbiter for Jurisdictional Disputes

The nineteen unions in the Building Trades Department of the American Federation of Labor are reported to have agreed to accept the appointment of Dr. John A. Lapp, labor relations director of PWA as final arbiter in jurisdictional controversies on which the unions involved are unable to reach an agreement. Dr. Lapp will have full authority to settle such disputes under the new plan, according to an announcement made by William Green, president of A.F.L., and Dan W. Tracy, president of I.B.E.W., who headed a special building trades union committee to study the jurisdictional question.

Under this plan, work on a disputed project will not be suspended during the period of deliberation, and attempts will be made to settle the dispute between the unions before the arbiter's services are called upon. Dr. Lapp will continue to hold his PWA post.

More Electrified Farm Exhibits

Plans to set up exhibit electrified farms in many parts of the country are going forward according to the Rural Electrification Administration. These farms are intended to demonstrate the various uses of electricity on the farm and in the rural home, and to guide new customers in choosing their own electrical appliances. Patterned after the REA electrified farm near Herndon, Va., which was exhibited during the recent Third World Power Conference, the new projects are to be greatly simplified and their cost reduced, in some cases entailing an outlay of about $1,000.

Exhibit farms are now being pushed actively in Virginia, Ohio, Indiana, Florida, and North Carolina. Three farms are now being equipped, mostly at the expense of their owners, in the territory served by the Farmers Rural Utilities, Inc., of Bowling Green, Va. These farms will be open to visitors and will provide a working demonstration of farm equipment in actual use. One exhibit is a general farm, another a dairy, and the third is a poultry farm which includes a commercial hatchery. Organizations in Ohio and Indiana are working on plans for a series of exhibit farms to demonstrate dairying, water systems, electrified kitchens, and other appliances for one special consideration.

Local Groups Active in Carolinas

Since the formation of the Carolinas' Association of Electrical Contractors and the subsequent appointment of C. S. Boger as executive secretary to cover its activities in North and South Carolina, a steady program of local activity is reported. In South Carolina, contractors of Spartanburg and Greenville have been meeting each month to discuss the NECA voluntary agreement plan, proposed state legislation, and other industry problems. At Greenville, three contractors have met weekly and are ready to conduct their business under the voluntary agreement plan.

In North Carolina, the Ashville Association of Electrical Contractors, comprising five members, has been formed as an affiliate of C.A.E.C., with W. A. Ward as chairman and Marion B. Haynes as secretary and treasurer. Four members have already signed the voluntary agreement plan. This group is active at present in promoting state legislation and a new city ordinance.

At Lenoir, N. C., a 100 per cent membership is reported in the Carolinas' and the local, which is known as the Caldwell Association of Electrical Contractors. Contractors from Hickory and Morgantown will be invited to join this group, which is now operating under the voluntary agreement plan.

A similar report is made covering the Statesville (N. C.) Association of Electrical Contractors, which has five members, with O. L. Lippard elected as chairman and B. J. Powell, secretary and treasurer.

The Charlotte (N. C.) Association of Electrical Contractors is holding weekly dinner meetings with outside speakers being invited. A part-time secretary is now being considered by this group to handle its increased activities. New officers are: C. W. Moseley, chairman; Wm. Anderson, vice-chairman; and R. B. Timmons, secretary and treasurer.

WONDER HOUSE:—Entrance to two-story ten-room "Edison Wonder House" erected by the Brooklyn (N. Y.) Edison Co. in its showroom to demonstrate not only the numerous types of residential appliances but all forms of lighting and wiring conveniences. This is probably the most complete electrical demonstration house from every angle yet shown.

A Million Electrified Farms in 1937

Based on statistics showing that 860,000 farms were given electric service by June 1936, the September issue of Rural Electrification News expresses hope that one million farms will be served by the beginning of 1937. There were 71,243 farms given service from January to June of this year. Heavy contributors to the record-breaking progress in rural electrification for 1936 were the state of New York with a five-fold increase over 1935, the excellent progress in Illinois aided by the State Rural Electrification Committee, and unprecedented private utility construction in Georgia.

NEMA Adds Fuse Panels to Model Farm Exhibit

In connection with the circuit protective equipment at the REA Demonstration Farm at Rosedale, Virginia, which was described in the August issue of ELECTRICAL CONTRACTING, the National Electrical Manufacturers Association has released the following statement:

"Considerable publicity has been given to the wiring system and electrical equipment installed at the Rural Electrification Administration Demonstration Farm near Herndon, Va. In this publicity emphasis has been placed on certain features of the wiring system which, while it is very modern and installed in a manner which would make it a practical guide for any of the several standard types of wiring for installations of this character, was not until recently completely representative.

"The particular phase of the wiring

HAZARD

Firekrome SAFECOTE *Building Wire*

FIRE AND MOISTURE RESISTANT

THE *Ideal* BUILDING WIRE

• Insulated by Hazard, with nearly 40 years of experience. Hazard is a division of The Okonite Company.

• Protected by Safecote braid, the most recent development in fire and moisture retarding braids.

•Hazard Firekrome Safecote building wire will last as long as the building itself. Hazard insulation is noted for its long life.

• Hazard Firekrome Safecote combines fire and moisture resistance to give the perfect building wire.

•Free stripping insulation; easy to handle; 6 identifying colors; does not become tacky or brittle; braid does not bunch up in conduits; lubricated for easy pulling.

HAZARD INSULATED WIRE WORKS

Division of The Okonite Company
WORKS: WILKES-BARRE, PA.

Sales Offices:

New York Chicago Philadelphia Pittsburgh Buffalo Boston
Detroit Atlanta Seattle Dallas San Francisco Los Angeles Washington

CONFIDENCE is the seed of PR

Just as the seniority of the hen or the egg never has been settled, so, too, the priority of success or confidence will ever be a matter of debate. Obvious it is that one begets the other—evident it is that the result is the same no matter which precedes. It has been amply demonstrated that to succeed you must have confidence. Prosperity comes as confidence grows, and confidence grows with prosperity.

Safecote sales are increasi is growing. Thus this ev becomes an ever growing which accrue to the ad wholesaler, contractor, a or uses Safecote Electrica *There is no substitute for*

f PROSPERITY

re increasing because confidence in Safecote
us this ever widening circle of confidence
er growing volume of sales the benefits of
to the advantage of every manufacturer,
tractor, architect, and electrician who sells
e Electrical Conductors.
stitute for Safecote.

FLAME RETARDING MOISTURE RESISTING
SAFECOTE
FISHABLE — SLICK FINISH
REG. U.S. PAT. OFF.

U. S. LETTERS PATENT NUMBERS:

1,635,829	1,772,436	1,765,000
1,798,486	1,410,790	1,836,549

OTHER PATENTS PENDING

INSIST UPON GENUINE SAFECOTE FOR YOUR PROTECTION

SAFECOTE LABORATORIES ARE AT YOUR DISPOSAL
SAFECOTE PERFORMANCE SPECIFICATIONS UPON REQUEST

GEORGE C. RICHARDS, LICENSOR'S AGENT
155 EAST 44th STREET, NEW YORK CITY

system which has been amplified deals with the circuit protective devices that have been included. The two methods of providing such protection are by means of circuit breakers or by fuses, either of these methods being equally satisfactory when properly installed.

"The wiring installation at the farm has now been made thoroughly representative of what the industry has to offer by the introduction of a series of five fuse panels which supplement an equal number containing circuit breaker equipment.

"This addition to the equipment of the farm has been supplied by members of the National Electrical Manufacturers Association who have provided all of the other important electrical equipment which has been installed at the farm."

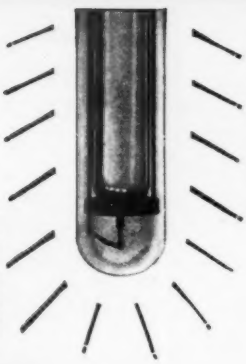
Plans Set for 100 REA Wiring Loans

An operation covering the wiring with REA funds of 100 farms in the Champaign County, Ohio, territory has progressed to the stage of receiving and tabulating bids from independent contractors. This work is to be done out of a $30,000 loan which was recently announced, and is subject to REA approval. This initial operation was delayed while details of plans and specifications were worked out with various contractors and material manufacturers.

A plan was agreed to which attempts to cover the specific installations under the following general requirements: Safety to the farm family; economy

INDUSTRIAL SPECIALIST: Edward J. White of Newark, N. J., heads a busy organization which serves industrials of that area. The Edward J. White Co. has done several large industrial modernization jobs and is now busy with a paint factory expansion program and the modernization of a large brewery, with 25 men employed. Mr. White builds customer confidence through going out of his way to take care of their minor troubles. When important work is to be done later on, this company's experience and familiarity with its plant problems swings the job.

FOR HIGH EFFICIENCY
MERCURY VAPOR LAMPS



The new mercury vapor lamps give more light per unit of current—reduce electric bills — Jefferson Transformers insure maximum economy.

JEFFERSON TRANSFORMERS

SIMPLIFY INSTALLATION

Industrial plants, railroads, service stations, large stores—are finding the new high efficiency of mercury vapor lamps an immediate means of improving illumination and cutting electric bills in half.

Jefferson Transformers for use with these lamps insure the expected full rated capacity and satisfactory performance. They keep the current demand low during the starting period and on continuous operation show low temperature rise. A special core has been designed, made up of very thin laminations of high silicon steel, annealed after punching to prevent ageing, and to insure cool operation.

Easy, "Screw-Driver" Installation

The terminal connections are easily made with a screw-driver,—no pigtails to solder.—And the wiring compartment covers have permanently attached screws to save time and loss.—Width and depth are smaller to improve the appearance.

Jefferson's long specialized experience in the development of transformers for mercury vapor and Neon luminous tubes, sun lamps, street lights and the like, makes possible the high quality special types of transformers and reactors required for these vapor lamps.

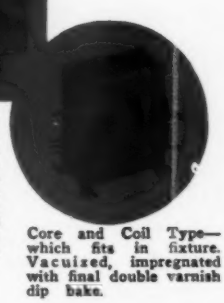
Available for use with both 250-watt and 400-watt lamps.—Write or mail coupon for Bulletin 361-MV. . . . JEFFERSON ELECTRIC COMPANY, Bellwood (Suburb of Chicago) Illinois. Canadian Factory: 535 College St., Toronto.

Wall Mounted Type in neat metal case for mounting on wall or post. Bottom is open for ready access to wiring compartment. Snap-on connections make it easy to match primary supply line voltage.

(Wall-mounted and fixture types are equipped with primary tap changing device and large primary and secondary wiring compartments.)

Fixture or Suspension Type for mounting between ceiling and lamp—with standard threaded coupling at each end.

Weatherproof Type in one-piece drawn steel case — interior compounded. Connections at bottom. Equipped with primary tap changing device.



Core and Coil Type—which fits in fixture. Vacuized, impregnated with final double varnish dip bake.

JEFFERSON *Mercury Vapor Lamp Transformers*

JEFFERSON ELECTRIC COMPANY,
Bellwood, Ill.

Please send Bulletin 361-MV and complete information on mercury vapor lamp transformers.

Name .....

Address .....

City & State .....

CLAYTON TO KNIGHT: D. B. Clayton of Birmingham, Ala., (Right) has become associated with Carl Teal in operating the Knight Electric Co., a pioneer electrical contracting organization of that city. Mr. Clayton is executive committeeman for the Southern Division of N.E.C.A. He formerly operated the Mill & Mine Construction Co. at Birmingham, specializing in heavy industrial construction work in that vicinity. Mr. Clayton will be active in similar contracting and engineering work, also in commercial and large residential work.

consistent with future developments in the way of replacements and additions; qualified workmanship that will minimize inspection troubles; and proper locating of outlets to give the maximum benefits.

Rocky Mountain Adequacy Promotion

Material results are expected from efforts promoting adequate wiring by the Electrical League of Colorado and the Rocky Mountain Electrical Association. The annual Panorama of Electrical Progress, to be held in Denver, Colo., this fall, is expected to include contractor booths in which adequacy will be stressed. Radio broadcasts, wiring and newspaper advertisements will emphasize the need for adequate wiring.

Protest Part-Time Inspectors

A strong protest against the employment of contractors as part-time inspectors was presented to the annual meeting of the Eastern Section, I.A.E.I., in New York, September 8 to 10, by the Master Electricians Association of Boston.

San Francisco Adopts Classified Dues

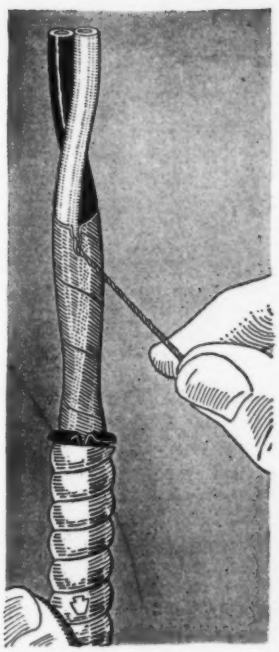
A budget was recently prepared by the San Francisco (Calif.) Electrical Contractors Association which is based on financing its affairs from dues received among two classes of members. Class A and Class B members have been set up by the board of directors, based on the volume of work done during the preceding year. The new dues plan constitutes a flat monthly charge

HAZARD

Presents A New Cable

SAFE *and* CONVENIENT

WATCH for the announcement of this new Hazard cable. This addition to the chain of Hazard Building Wire products will fully sustain the high standard maintained by Hazard for thirty-eight years. See our complete descriptive announcement in the next issue.



HAZARD INSULATED WIRE WORKS

Division of the Okonite Company

WORKS: WILKES-BARRE, PA.

Sales Offices:

New York Chicago Philadelphia Pittsburgh Buffalo Boston Detroit
Atlanta Seattle Dallas Washington San Francisco Los Angeles

which is estimated to be sufficient to cover local, state and national association dues. The previous dues, which were based on charging a percentage on each member's gross business, were reported to have been unsatisfactory because of controversies and argument. Such differences were said to break down the confidence of the member in the value of his association.

Des Moines to Issue Qualified Contractor Cards

Following a recent campaign which resulted in adding more than one-half its local non-N.E.C.A. members as members of the state and national association, the Electrical Contractors Association of Des Moines, Ia., is now planning to issue a display card which will list its membership as "Qualified Electrical Contractors". Further activity is being carried on to induce all other local contractors to qualify as members of the local, state and national associations before this card is released.

New Officers Elected

The following officers were elected for the Tidewater (Va.) Chapter, N.E.C.A., at the annual meeting held on June 29: E. T. Henderson, president; E. W. Caddell, vice-president; Geo. L. Wadsworth, secretary and treasurer; and Allan F. Hitt, H. I. Tuck, and C. S. Lovitt, directors.

Pasadena Group Formed

The Pasadena (Calif.) Electrical Contractors Association was organized in June 1936 with a 100 per cent local membership reported, plus membership from the neighboring communities of Alhambra, Altadena, Arcadia, San Gabriel, and South Pasadena. Open meetings are held weekly to which representatives from other industry groups are invited to speak on subjects of mutual interest. An educational committee was appointed to work out blackboard problems at various meetings. Officers were elected as follows: Harry I. Bayers, president; O. S. Purdy, vice-president; W. E. Langstaff, treasurer; William Lindsay, secretary; and C. A. Rowley, Harry I. Bayers, Larry E. Chapman, O. S. Purdy, and J. E. Talbott, directors.

Kansas City Considering Sales Control

Following the recent death of a baby from electric shock, Leo J. McCormick, city electrician of Kansas City, Mo., was officially instructed to gather information for an ordinance to restrict the sale of unapproved materials.

WEBSTER ELECTRIC

Teletalk

You can sell Teletalk to every busy business man

● You can sell this modern, needed business tool to at least three out of every five business offices in town. Teletalk, the first *perfected* two-way communication system, is as necessary to business efficiency as the telephone.

Take two of these attractive Teletalks to any office . . . put one on the manager's desk and the other wherever he assigns (secretary, shipping clerk, department head, etc.) . . . connect the two with a wire, plug into the light socket . . . and you have made a sale. *A highly profitable sale.*

Teletalk's operation is simplicity itself. Merely press the control lever down to speak, then release to listen. It is completely self-contained. No extra units, no separate microphone. Teletalk operates on either AC or DC; is absolutely hum-free; has variable volume control; unusually faithful voice reproduction. Although non-selective, as many as six stations may be operated on a single system, thus making it an efficient paging system.

Send, right now, for literature and prices. Teletalk offers you greater possibilities than any other item you are now selling. Cash in, now, on this wide-open market. WEBSTER ELECTRIC COMPANY, Racine, Wisconsin, U. S. A. Export Department, 100 Varick Street, New York City.

[*Webster Electric Sound Systems are licensed by agreement with Electrical Research Products, Inc., under patents owned by Western Electric Company, Inc. and American Telephone and Telegraph Company*]

WEBSTER ELECTRIC

SOUND EQUIPMENT

A Roll o' Tape

Field notes about men of the contracting shop, and inspection branches of the industry

THE extra time consumed in making tests and reports on specialties, such as smoke detector alarm systems and the like, makes it necessary to get a price to cover more than the final installation cost, says Arthur L. Davis, Davis Electric Co. of Newark, N. J.

S. D. THACHER of the E. L. Overton Electric Co., Topeka, Kan., makes the store lighting business a matter of home-town pride, claiming that a new ladies' apparel shop just completed under his supervision at Topeka equals the swankiest in anyone's town.

AMONG the job photos of the Eugene Ashe Electric Co., Fort Worth, Tex., is one that suggests a "Bring 'Em Back Alive" safari. It is, however, a single file of laborers walking along 10 ft. apart with a large parkway feeder cable on their shoulders, and not a huge python.

SUCH a complete stock of small repair parts for fans, and other devices is carried by the J. J. Cease Electric Co. of Tulsa, Okla., that this company enjoys a steady flow of business from other local contractors and repair shops, as well as from its own customers. Mr. Cease has made it his business to know what is needed for repairing a wide variety of makes of small motors.

GOOD industrial lighting jobs only result from a careful and impartial analysis of the several available types of light, says J. M. Clayton of Atlanta, Ga. This veteran industrial contractor finds such varied conditions in the textile field that it is not safe engineering practice to become fixed upon one popular light source. Often a blended source, or a

predominance of mazda, or again a predominance of high or low intensity mercury vapor results in the most desirable effect.

WHEN the title "The Motor Doctor —M. D." was conceived by H. Josephson of the H. J. Electric Co., Inc., of New York, N. Y., a copyright was obtained therefor. Accordingly, gummed advertising labels that are used by this company bear the above title.

WHEN Chas. R. Shrake, Shrake Electric Co., got back to his home town of Topeka from a recent state meeting of the Kansas Electrical Contractors' Association which was held at Wichita, he felt all pepped up over having received as treasurer more than $100 in state dues from contractors who were again inclined to carry on.

TO prove to its customers that commutators have been entirely re-insulated, the New York (N. Y.) Armature Works, Inc., leaves the new mica projecting at the bar ends when the commutator design permits. Often, says W. H. Beard, the gyp repair shop limits its work to re-insulating only those bars that test bad, yet charges for a complete re-mica job.

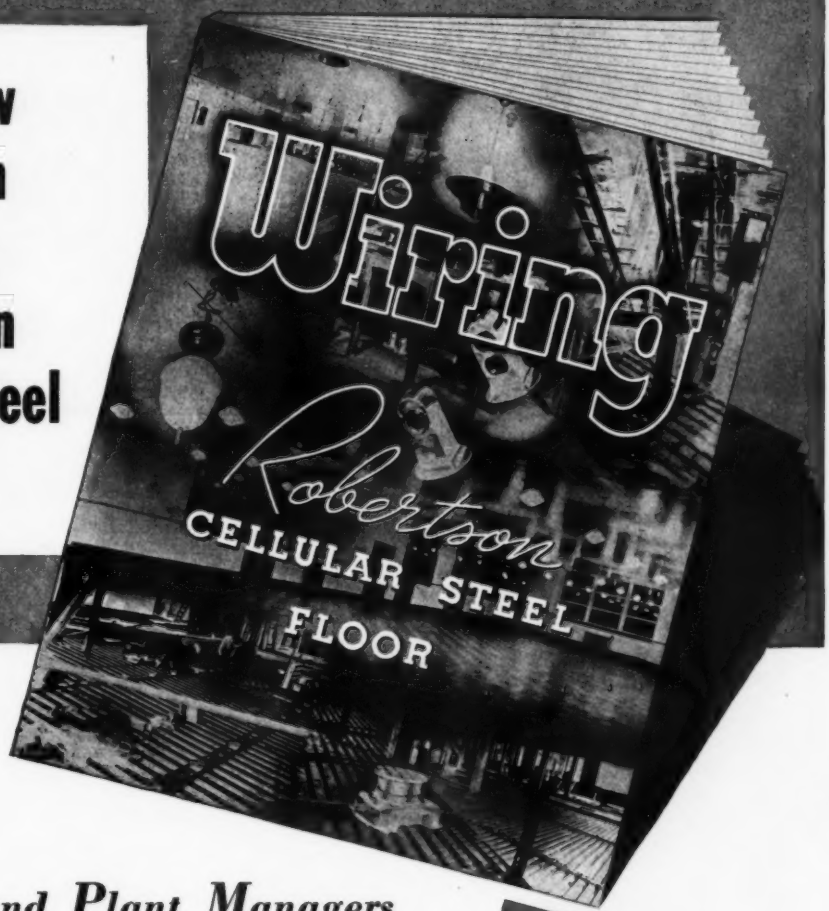
STRIVING to force shop mechanics who operate motor-driven grinders and polishers to use goggles, Charles Menge of the Chas. Menge Co., Jersey City, N. J., has a patent pending covering a safety cut-off switch for such machines. With Mr. Menge's design, the motor cannot be started until safety goggles have first been removed from a spring-actuated lever or hook. This lever incorporates a mercury type tipping switch which keeps the motor circuit or a relay circuit open as long as the goggles are hung thereon.

SERVICE shop employee training is only undertaken when new men are willing to supplement their daily shop experience with a recognized night course in electrical engineering, according to Joseph Heller, Consolidated Electric Motor Repair Co., New York, N. Y. At present five of this company's eleven men are in various stages of a 6-year course.

JUST to carry out the principle of a switch for controlling every ceiling outlet, the Graham-Collins Electric Co., San Antonio, Tex., has provided a separate wall switch to control each lighting fixture in its large display room. These switches are arranged in gangs of thirty-six on wrought-iron plates installed at six or more locations. In other words, pull-chains at the store would imply pull chain controls in the home.

FREE!

This New Book On Wiring Robertson Cellular Steel Floor



For Engineers, Contractors and Plant Managers

THIS instructive new book, just off the presses, describes clearly and in detail the methods of wiring buildings in which the Robertson Steel Floor is used. It contains a complete description of the Robertson Floor and how to take advantage of its electrical facilities. Layout data. Engineering data. Installation data. It's all here. Practically everything you could want to know about wiring the Robertson Floor is answered for you between the covers of this book.

Don't fail to send for your free copy. Merely sign and mail the coupon at the right. Do it . . . today.

H. H. ROBERTSON COMPANY
2003 Grant Building Pittsburgh, Pa.

Send coupon for your copy!

H. H. Robertson Company,
2003 Grant Building, Pittsburgh, Pa.

Please send me, without obligation, your new book entitled "Wiring Robertson Cellular Steel Floor."

Name_____

Address_____

City_____ State_____

Trade Notes . .

Eagleston to Head Up General Cable Sales

General Cable Corp., White Plains, N. Y., announces the appointment of Howard E. Eagleston as general sales manager with headquarters at 420 Lexington Ave., New York, N. Y. Mr. Eagleston was formerly Pacific district manager for this company.

Enameled Metals Co., Pittsburgh, Pa., has appointed McKinley-Mockenhaupt Co., 626 West Jackson St., Chicago, Ill., as its sales representative.

The Harnischfeger Corp., Milwaukee, Wis., has appointed the Arthur Wagner Co., 701 West Washington St., Chicago, Ill., as a distributor of its products in the northern Illinois territory.

Trade . . . . . Literature . . .

Phototube Equipment: Bulletin No. 161 giving technical data and dimensions of phototube relay equipment and accessories complete with performance charts and diagrams. G. M. Laboratories, Inc., Chicago, Ill.

Farm Wiring: 28-page booklet giving text of speech by H. G. Knoderer, commercial engineer, before annual meeting of American Society of Agricultural Engineers including a discussion of what constitutes adequate wiring for model farm homes and outbuildings. General Electric Co., Bridgeport, Conn.

Power Transformers: Loose-leaf, bulletin 181, covering single and three-phase power transformers; water-cooled, forced-oil-cooled and airblast-cooled oil-filled transformers and pothead transformers. Wagner Electric Corp., St. Louis, Mo.

Lighting Equipment: A complete listing of Kliegl products for theatrical, decorative and spectacular lighting; studio equipment; effects, accessories and specialties. Profusely illustrated and detailed. Catalog No. 40, 96 pages. Kliegl Bros. Universal Stage Lighting Co., Inc., New York, N. Y.

Electric Plants: Bulletin 23-1, a.c. and d.c. gasoline electric plants. Janette Mfg. Co., Chicago, Ill.

Transmission Line Material: "Universal" fuse links for power line distribution cutouts, pamphlet AD-1305 and porcelain-housed disconnecting switches of the multi-point contact clip type for distribution sectionalizing. Bulletin No. 210. Schweitzer & Conrad, Inc., Chicago, Ill.

Watertight Connectors: Bulletin No. 4936 describes watertight connectors for use with outdoor conduits that are terminated in box knockouts, and several types of watertight connectors for service entrance cable. Rattan Manufacturing Co., New Haven, Conn.

Range Control Parts: Bi-rotary range switches, hydraulic oven thermostats and toggle type feeder switches are described in a 4-page folder The Hart Mfg. Co., Hartford, Conn.

Pliers: Leaflet describing Bernard plier line and announcing new lamp base extractor tool. The Wm. Schollhorn Co., New Haven, Conn.

Fans and Blowers: A 64-page catalog No. FB-45 covering the Ilg line of fans, blowers, ventilators and accessories. Installation and design data is included. Ilg Electric Ventilating Co., Chicago, Ill.

Motors: Pamphlet giving engineering data governing selection and application of totally enclosed fan cooled motors. Lincoln Electric Co., Cleveland, Ohio.

Sound Transmission Instruments: Loose-leaf catologue covering precision type instruments and allied products for sound transmission. Tech Laboratories, Jersey City, N. J.

Wiring Handbook: A wiring data handbook with description of insulation characteristics, recommendations for product applications and tables of wire and cable requirements for major types of building. Anaconda Wire & Cable Co., New York, N. Y.

Transite Conduit: A 32-page booklet on Transite and Korduct for the electrical industry, complete with illustrations and data on accessories. Johns-Manville Corp., New York, N. Y.

Cellular Floor Wiring: A 52-page illustrated catalog and manual, "Wiring Robertson Cellular Steel Floor," which gives complete installation details for six basic types of cellular steel floor for which the Robertson Wiring System may be employed. Data includes typical plan layouts, various symbols, suggested specifications, and a listing of all complementary electrical fittings. A complete description of the "Underside Header" system is included. H. H. Robertson Co., Pittsburgh, Pa.

Classified Advertising

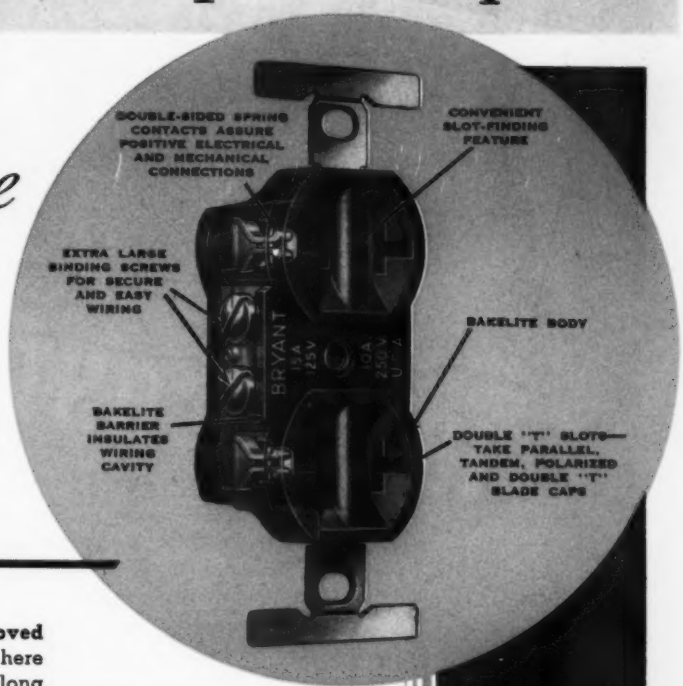
Winding Data A.C. Motors—save time and money. $1.50 per set. Delivered parcel post C.O.D. on receipt of order. Supreme Electric, 24 W. 20th Street, New York, N. Y.

Position Wanted: Engineer and estimator desires position with contracting concern. Twelve years' experience as estimator and engineer for New York contractors. Technical graduate, licensed engineer, specializing in large public and industrial installations. Can do sales work if desired. Very reasonable salary. Will accept part time work. Details upon request. Box 101, Electricial Contracting, 330 West 42nd St., New York City.

Announcing—the Improved

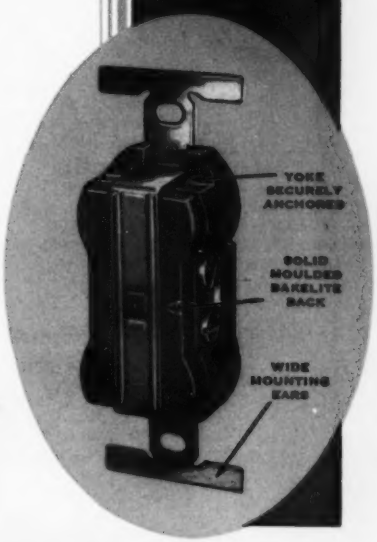
BRYANT No. 4832 Duplex Receptacle

Look at These 11 Important Features



Excuse our enthusiasm — but the **improved** Bryant No. 4832 Duplex Receptacle shown here is the finest wiring device we've seen for a long time. It has **everything** to please electrical contractors, architects, engineers and building owners. Here are its eleven big features:

● 1. **Double-sided Spring Contacts.** Firmly grip both sides of engaging blades and assure positive electrical connection. ● 2. **Four Extra Large Binding Screws.** Readily accommodate two No. 10 conductors. ● 3. **Bakelite Insulating Barrier Over Wiring Cavity.** Adds safety with ample wiring space. ● 4. **Slot-finding Feature.** Aligns blades with slots, making insertion effortless. ● 5. **Double-T Slots.** Take all types of caps. ● 6. **Yoke Securely Anchored.** Materially adds to strength. ● 7. **All-bakelite Device.** Both body and back plate are of solid molded bakelite, preventing moisture absorption. ● 8. **Wide Mounting Ears.** Made integral with yoke to assure flush mounting. ● 9. **Approved and Rated.** Listed and approved by Underwriters'. Rated at 15A., 125V., 10A., 250V. ● 10. **Meets All Federal, State and Municipal Specifications.** ● 11. **Priced Right.** Popularly priced, no more than previous type.



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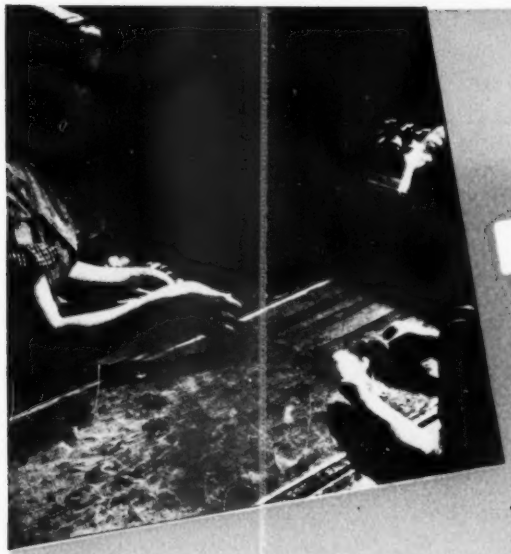

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ITS ADVANTAGES AS AN ELECTRICAL INSULATOR

High heat resistance. High resistance to corona. High dielectric strength. The insulation least affected by continuous high temperature, mechanical vibration and periodic high voltage. Highly resistant to oils, acids, moisture and salt vapors. It is of a permanent nature and does not deteriorate with age. It is mechanically strong and flexible, and can be molded readily into convenient shapes by the use of bonds and applied heat and pressure.

J 30046

RECOMMENDED APPLICATIONS ★ ★ ★

Armature Coils

Strands and conductors.....Jap Paper and Mica Tape No. 228
Strands and conductors, where extra mechanical strength is required.....Untreated Cloth and Mica Tape No. 350
Coil, ground insulation.....Untreated Fishpaper and Mica Wrapper No. 232
Coil, ground insulation, where extra dielectric strength is desired.....Treated Rope Paper and Mica Wrapper No. 227
Slot cells, ground insulation.....Fishpaper and Mica Slot Cells No. 356
Slot cells, ground insulation.....Treated Cloth and Mica Tape No. 240

Commutators

Between bars, undercut.....Segment Mica Plate, White No. 207
Between bars soft, not undercut.....Segment Mica Plate, Amber No. 210
V-rings milled.....Hot Molding Mica Plate, Milled No. 251
V-rings unmilled.....Hot Molding Mica Plate, Unmilled No. 344

Field Coils

Taping.....Untreated Cloth and Mica Tape No. 350
or Treated Cloth and Mica Tape No. 240
Washers and protective pieces.....Asbestos and Mica No. 246

Heating Apparatus

Temperatures under 500°C.....Heater Mica Plate, White No. 209 or No. 351
Temperatures of 500°C and above.....Heater Mica Plate, Amber No. 250 or No. 338

Molding and Forming

General molding with application of heat and pressure.....Hot Molding Mica Plate, Milled No. 251
or Hot Molding Mica Plate, Unmilled No. 344
General cold forming without the use of heat.....Flexible Mica Plate No. 237

Westinghouse

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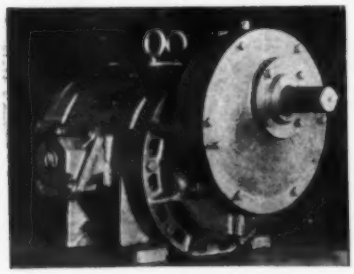
Varnishes
Cements - Compounds
Treated and Untreated Fabrics and Papers - Micas

New Products . . for October . . . .

Explosion-Proof Gearmotors

Single reduction explosion-proof gearmotors ranging in size from 1½ to 75 hp., for application in Class 1, Group D loca-



tions, such as in dry-cleaning and dry-dyeing, pyroxylin plastic manufacturing, gas, and varnish manufacturing plants. Features of design include compactness, high efficiency, "tough hard" gear treatment, ability of single helical type gears to carry maximum motor torque, and anti-friction bearings. Westinghouse Electric and Mfg. Co., East Pittsburgh, Pa.

Fuse Clip Clamp

An auxiliary clamp for increasing the contact pressure of fuse or switch clips. A steel clamping ring claimed to fit all clips regardless of width is provided with a knurled-top insulating knob for regu-

lating the contact pressure. Safety in preventing accidental contact with live parts, and the ease of quickly removing the clamps for fuse replacements are featured claims. Ideal Commutator Dresser Co., Sycamore, Ill.

Industrial Cable

A multi-conductor cable for severe industrial uses in which extreme flexibility, resistance to oil, grease, gasoline, and mechanical abuse are necessary. Made

with a heavy outer covering that is woven like a fire hose, and which is saturated and finished smoothly with moisture resisting, flame retarding compounds. Recommended for making flexible connections to equipment which may need to be re-located. The assembly is said to offer a neat appearance when it is suspended in the open, and can be firmly attached to control equipment and distribution devices with available fittings. Three 600-volt insulated conductors and one bare ground conductor, all of seven strands, are cabled with saturated jute fillers and bound together by presaturated tape. This method of assembly is claimed to withstand severe impact without chafing or fraying. Anaconda Wire and Cable Co., New York, N. Y.

Long Range Floodlights

Extremely concentrated beam characteristics are claimed for "Long-Range" open type floodlights, for football and

other sports lighting from distances of 60 to 110 ft. back of the sidelines. Also recommended for railroad yards, construction work and other applications where the unit can be mounted within 275 ft. of the area to be lighted. Made of Alzak aluminum, and for mounting heights of 55 to 70 ft., these units include a deflector to direct light from the extreme upper areas into the area below the unit. Benjamin Electric Mfg. Co., Des Plaines, Ill.

De-Ion Linestarters

Push button controlled starters employing the De-ion principle of arc interruption for across-the-line starting of single phase and polyphase squirrel cage induction motors, and as primary switches for wound rotor induction motors. Suited for built-in control applications, with all parts made accessible from the front, self insulated and mounted on a steel base. Doors are hinged and swing to a full open. Motor protection is provided by a thermostat disc overload relay which has inverse time characteristics to prevent shut downs due to temporary overloads. Protection is provided against single phase and locked rotor operation. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

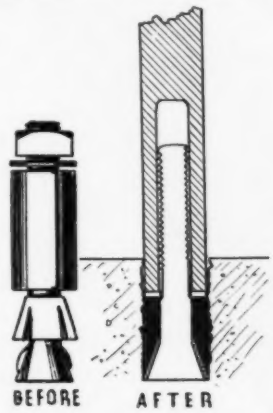
Adjustable Oiler

The "Drip-Drop" oiler for solid, wick and waste-packed bearings provides adjustable feed control to meet the exacting requirements of bearings varying in

size, speed and temperature. Made in three sizes, of a design that is claimed to fit 95 per cent of installations without drilling or tapping. Trico Fuse Mfg. Co., Milwaukee, Wis.

Expansion Bolt

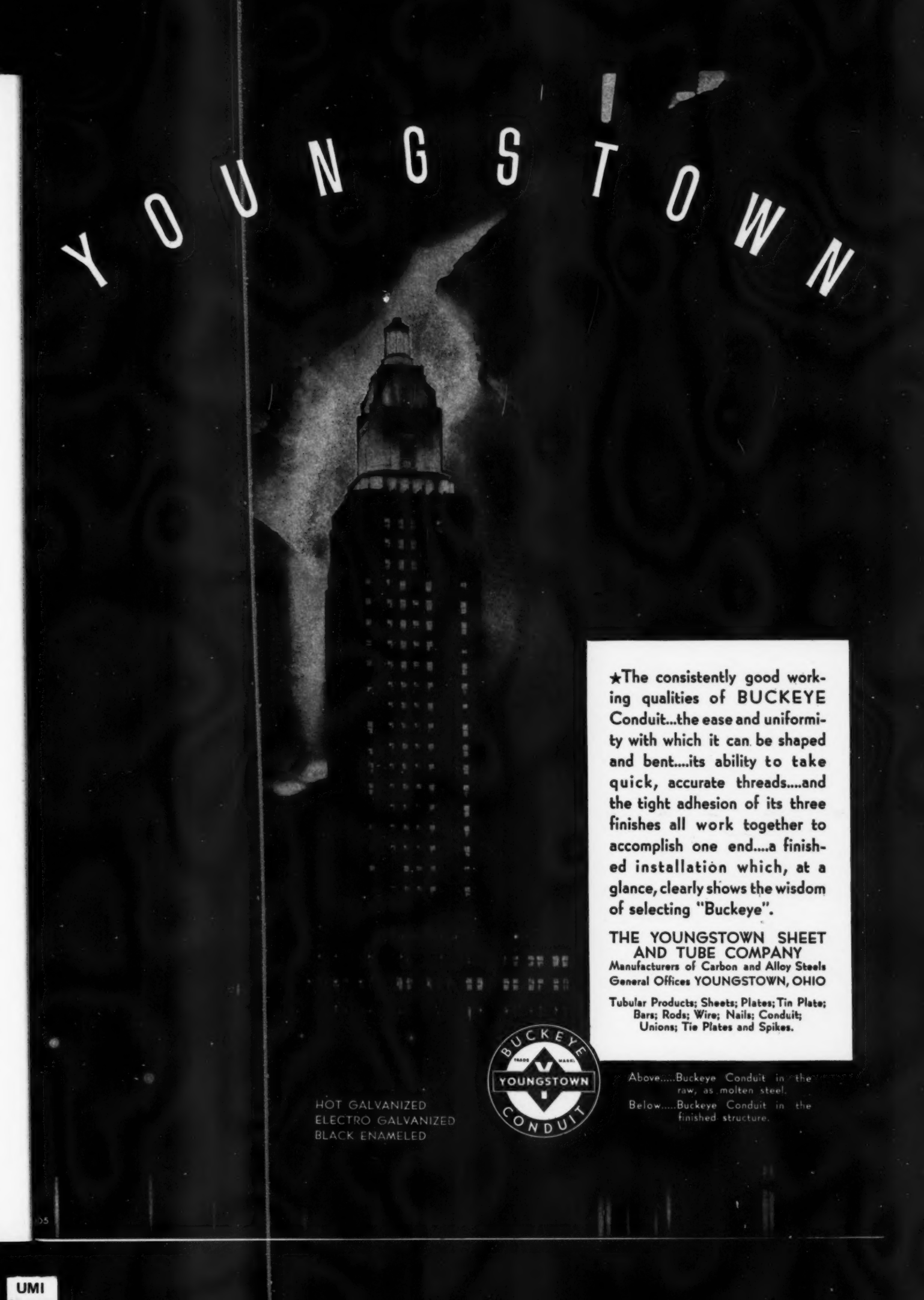
The "Life-Time" expansion bolt utilizes a steel bolt and expanding cone, a lead jacket and a steel driving washer. This design is said to provide more satisfactory expansion of the driven lead jacket around the bolt. The expanding cone is claimed to fill the hole space around the bolt and prevent the flow of driven lead around and behind the bolt head, while also forcing the bolt toward the back of the drilled hole. The upper washer provides a bearing for driving the lead jacket and is said to prevent the "backing up" of lead into the setting tool. Bolts are available in sizes of ¼-in. to ⅜-in. diam. and 1½ in. to 8 in. long, with setting tools to correspond. Plain,



cadmium and hot galvanized finishes can be had. Chicago Expansion Bolt Co., Chicago, Ill.

Conduit-Box Connector

National "Bondhub" connectors are designed for making tight connections between threaded rigid conduit and knockout boxes. Three parts are used: A hub with one end threaded to fit on the con-



★The consistently good working qualities of BUCKEYE Conduit...the ease and uniformity with which it can be shaped and bent....its ability to take quick, accurate threads....and the tight adhesion of its three finishes all work together to accomplish one end....a finished installation which, at a glance, clearly shows the wisdom of selecting "Buckeye".

THE YOUNGSTOWN SHEET AND TUBE COMPANY
Manufacturers of Carbon and Alloy Steels
General Offices YOUNGSTOWN, OHIO

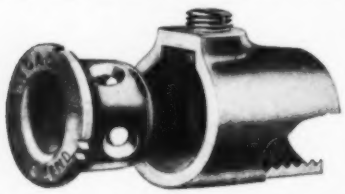
Tubular Products; Sheets; Plates; Tin Plate; Bars; Rods; Wire; Nails; Conduit; Unions; Tie Plates and Spikes.

BUCKEYE TRADE MARK YOUNGSTOWN CONDUIT

HOT GALVANIZED
ELECTRO GALVANIZED
BLACK ENAMELED

Above.....Buckeye Conduit in the raw, as molten steel.
Below.....Buckeye Conduit in the finished structure.

duit, a telescoping flange sleeve, and a wedging screw. Wedge tension of this screw is said to tighten the flange and hub against the box wall to prevent them becoming loose from vibration. Ease of installation is claimed because the wedge screw may be inserted at either of two



holes in the flange to take care of varying box wall thicknesses; neither the box nor the conduit need be turned; and only a screwdriver is needed to tighten the wedging screw. It is claimed that the necessity for using bonding jumpers or threaded outlet fittings is eliminated when "Bondhub" connectors are used. National Electric Products Corp., Pittsburgh, Pa.

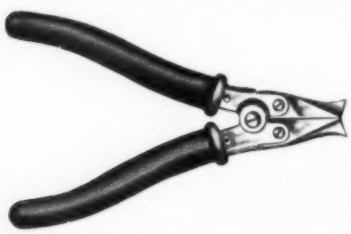
Fixture for Silvered Bowl Lamps

The "L'OR-Ray" series of 300 to 1,500-watt luminaires is recommended in design No. 154 for offices, stores, restaurants and other commercial lighting installations. Silvered bowl lamps are used in connection with a "Lunax'

aluminum bowl and stem. Interior reflecting rings are said to softly illuminate a small dome in the bowl bottom. A self-aligning canopy is provided. This unit is claimed to require for maintenance only a normal dusting, and is easily relamped through the bottom of the bowl. Curtis Lighting, Inc., Chicago, Ill.

Lamp Base Extractor

A plier designed for removing the shells of broken lamps from sockets. Rubber



jackets are provided over the handles to prevent shocks. Jaws are reverse acting and sharply pointed to grip the inside of brass lamp base shells with a slight pressure on the 6½-in. handles. The Wm. Schollhorn Co., New Haven, Conn.

85-Watt Mercury Vapor Lamp

A medium base 85-watt mercury vapor lamp for operation in conjunction with a transformer, which produces illumination practically equal to that of a conventional 200-watt incandescent lamp. An addition to the line of larger H.I.M.V. lamps, its small size and efficiency (3000 lumens) adapts it to compactly designed reflectors for meeting unusual industrial and commercial needs, especially where light is to be focused or its distribution

accurately controlled. Designed in types for burning base up or for burning in a horizontal position. Light center length is 3 in. and the overall length is 5⅝ in. Announced from recent releases by General Electric Vapor Lamp Co., Hoboken, N. J., and Westinghouse Lamp Co., Bloomfield, N. J.

Pre-Assembled Wiring Devices

Wiring devices which are supplied already mounted on bakelite outlet box covers, for use with standard 4-in. round or octagonal outlet boxes of the metal or

porcelain types. Single-pole and three-point tumbler switches, duplex convenience outlets, and porcelain lamp holders are available ready for integral mounting upon outlet boxes. This line is offered for general purpose use and for insulated farm installations. The Bryant Electric Co., Bridgeport, Conn.

Armored Cable Connector

A round concave washer free to tip or rotate independently of the set screw to which it is riveted is the important feature of the new armored cable connector being marketed under the trade name "Wesco Grip-Tite Connector." Manufacturer's claims are natural seating and automatic locking effect regardless of cable surface irregularities, no uncomfortable position on part of wireman, no twisting or turning in the hand. Made in ½-in. size of malleable iron with cadmium plated

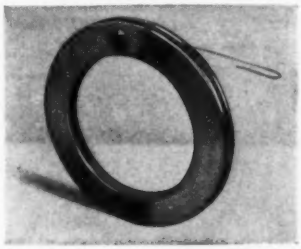
finish. Westinghouse Electric Supply Co., New York, N. Y.

Smaller 1000-Watt Lamp

An inside-frosted tubular bulb design for a 1000-watt general service lamp with an overall length of 9¼ in. Designed for 110, 115 and 120-volt service, with a rated life of 1000 hours, these lamps are recommended for factory, commercial and outdoor lighting. The new bulb shape, using heat-resisting glass, is claimed to withstand shocks and sudden temperature changes, while also permitting the use of smaller reflectors. Bulb blackening is said also to have been lessened in this design by the introduction of wire meshes to collect tungsten and sublimation. Announced from recent releases received from General Electric Co., Cleveland, O., and Westinghouse Lamp Co., Bloomfield, N. J.

Fish Tape Reel

A fish tape reel that not only prevents kinks, bends and breaks in the tape but which serves as a handle when pulling. The end of the tape is automatically locked within the reel. Although main-



taining a constant tension on the tape, it may be instantly run out to any length. Standard reels have 100 ft. of tape but will hold up to 250 ft. Available in two sizes, ⅛-in. by .060, and ⅛-in. by .060 tape. Ideal Commutator Dresser Co., Sycamore, Ill.

Solderless Lug

A line of solderless lugs for No. 8 up to 500,000 c.m. wire that is claimed to be interchangeable with soldering lugs of standard design and which requires no special tools or separation of wire strands for attachment. Ample pressure contact is claimed to eliminate heating, while an increase in pressure applied to the assembly is said to create a

greater locking effect on the wire. H. B. Sherman Mfg. Co., Battle Creek, Mich.

GENERAL CABLE GUARDIAN BUILDING WIRE

The Contractors' Choice!

1 Soft, Full Gauge Conductors—easy to work, and 100% dependable.

2 Long Life Rubber Insulation—exceptional in resistance to age-deterioration.

3 Free Stripping—strips readily to leave the conductor clean and bright for soldering.

4 Flame Retarding Finish—the wire will neither support nor carry a flame.

5 Moisture Resistant—a valuable quality under many installation surroundings.

6 Bright, Fadeless Colors—original brightness retained after years of service.

7 Easy to Pull—the wire is self-lubricated with a hard wax.

8 Cleanly to Use—the finish does not smudge where it touches walls, nor come off on the hands.

There isn't anything better—or more profitable to work with. Your Electrical Wholesaler carries it in stock.

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GENERAL CABLE GENERAL CABLE

CODE • INTERMEDIATE • 30% GRADES

Also: Guardian Brand PERFORMITE (Superaging) Building Wires and Cables which fully comply with all the requirements of Federal Specifications JC106.

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H&H "ALL ROUND" OUTLET

Simply drill an inch-and-a-half hole to install this *"all round"* outlet. Its round galvanized box has straight or curved clamp for ⅜" armored cable. Receptacle part is Bakelite with double T slot; the brass cover plate has brush brass finish. Box body is 1½" diameter; plate diameter 2½"; height over all 2⅛" including connector.

Nothing could be easier to install in baseboards, walls, mantels, show windows, store counters and in wood floors free of moisture. Just drill the hole, insert outlet and fasten on cover plate with two screws provided with each outlet. Specify Catalog Number 5016 for outlet with straight connector; Number 5017 with angle connector.

HART & HEGEMAN DIVISION
THE ARROW-HART & HEGEMAN ELECTRIC CO. HARTFORD. CONN.

The Economics of ADEQUATE WIRING

What is the effect of lower cost wiring on adequacy?

What is the cost of inadequate wiring?

Will home owners buy adequate wiring?

Will factory owners buy adequate wiring?

What is the effect of inadequate wiring on operation?

What assets are available to promote adequate wiring from the standpoint of

1. **The contractor**
2. **The manufacturer**
3. **The power company**
4. **The wholesaler**
5. **The inspector**
6. **The dealer**
7. **The electric league**
8. **The architect**
9. **The builder**
10. **The employee**

THE following pages give an appraisal of the general economics of adequate wiring from the standpoint of the consumer as well as the industry. Some of the material is the result of studies recently completed by the staff of ELECTRICAL CONTRACTING.

The symposium covering the hidden assets of the industry is presented to show the opportunities for organizing this industry to do a job of public education. Adequate wiring is one of the few things that the whole industry can get behind with the assurance that all will benefit.

The High Cost of Inadequacy

by Frank J. Seiler

Assistant Editor, Electrical Contracting

PARED-DOWN initial wiring costs are not only one of the major causes of inadequacy, but such restrictive installations serve also to emphasize the high cost of cheap wiring. Research within the records of the New York Board of Fire Underwriters' electical inspection reports, and interviews with electrical contractors in that area proved conclusively that cheap wiring is the most expensive wiring.

The cost to install additional feeder or submain capacity in buildings or various types usually runs from 200 to 300 per cent of the cost of a similar amount of work done during construction. The same holds true in many cases with regard to outlets.

What are the causes? The survey showed them to stack up in approximately the following order:

1. Few owners are willing to anticipate future tenant requirements. Bare minimum load is usually provided for.
2. The cost incurred later to correct overloaded wiring is disregarded for the sake of initial low cost.
3. Architects and builders either fail to investigate, or do not know how to plan and specify safe factors for handling future lighting and power requirements.
4. Many leases do not cover the alteration work that may be required to serve a new tenant adequately. Owners in such cases expect the tenant to pay the cost of rewiring, and exercise no supervision over the manner in which this work is executed.
5. Competition among contractors results in "skinning" the layout to get the price down.

Most serious examples of inadequacy were found to be in the following occupancies:

Multi-occupancy, "loft" type buildings used for light manufacturing purposes. This type of building is usually built without any definite knowledge as to probable power loads. Lighting circuits are frequently used to operate small motors or heating devices, resulting in excessive overloads, losses in lamp voltage, and frequent outages. These buildings are generally several stories high, running into the skyscraper class in New York. Tenants that occupy upper floors are soon at the mercy of other tenants whose motor loads exceed the capacity for a certain floor.

Commercial buildings, comprising stores, restaurants, beauty parlors, etc. Such buildings are often of the speculative type and the wiring is provided on a minimum basis, pending a lease. Any tenant who needs more capacity than is provided must have new feeders or submains installed. The existing submains must be abandoned because provisions are rarely made that will permit pulling in larger conductors from the main distribution center.

Apartment buildings. Hardly any buildings of this type have enough permanent outlets, although the feeders are usually ample. The well-known cord wiring evil exists everywhere.

Hotels, restaurants, and public gathering places. Trends in high-wattage loads for stage effects, plus air conditioning and kitchen modernization have placed heavy overloads on existing wiring systems.

Office buildings. Indirect lighting with higher levels of intensity have caused 50 to 100 per cent increases in branch circuit and feeder loads. Only the lack of full occupancy in many older buildings has permitted existing risers to carry these increases.

Factory buildings. Industries of all types and sizes have failed with few exceptions to make provisions for future capacity. When new machinery, larger motors, heating devices, and modern lighting loads are added, expensive changes in feeders must be made. Those departments that operate with overloaded wiring suffer in efficiency from loss of normal voltage. Outages, interruptions, and burn-outs of feeders and overloaded distribution equipment add to the penalty for lacking an originally adequate system.

Speculative store building groups or "taxpayers." These are usually wired for a low initial demand. Tenants in need of extra circuits or outlets, as for druggists, restaurants, beauty parlors, etc., must abandon the original submains and replace them with larger capacities. Branch circuits must be rearranged and panels enlarged, all at costs that run two and three times what would be incurred if the original plan had been made flexible to such changes. Often these changes are made in buildings that are occupied for the first time.

Cases of Expensive Correction

THREE TIMES INITIAL COST:—An apartment for 90 families, built ten years ago, had been rewired with cords. About 275 new outlets were finally installed in an approved manner at a cost of $2500. These outlets could have been provided originally for not over $900. Assuming the cord wiring that was removed to have cost $275, there was a total cost of $1875 in excess of an adequate original job.

$10 PER OUTLET:—The replacement of lamp cord wiring in an eight-year old 100-family apartment required the adding of 356 outlets at a cost of $3560. Here again the original installation could have included these outlets for one-third the final cost.

FIFTEEN THOUSAND FOR NEW FEEDER:—A 28-story office building which found its location more in demand by jewelry concerns and dress manufacturers was unable to serve its tenants well until a $15,000 feeder reinforcement was completed.

$20,000 TO REVAMP $18,000 ORIGINAL JOB:—An office building which was wired on a "cut-throat" bid of $18,000 had to have the wiring revamped to meet actual needs at slightly more than $20,000.

MOTORS OVERLOAD LIGHTING FEEDERS:—Factory tenants using small 110-volt motors overloaded the lighting feeders in a 14-story building until a $6,000 addition was necessary.

500 PER CENT INCREASE IN COST:—When a large merchandise display building was erected in 1925, its various display areas were separately metered with equipment that has since proved inadequate. The original extra cost for providing 60-amp. loops would have been about $10 each. Recent reconstruction of 154 loops ran about $60 each, or 600 per cent of the original difference in cost. In addition, several feeders were burned up through excessive loading before alterations were made that provided adequate capacity.

FACTORY FEEDERS BURN OUT:—A factory that was laid out in 1920 was expanded 30 per cent in 1926, but no feeder alterations were made. Between 1926 and 1935, the old feeders and distribution centers burned out several times, costing more in replacement than a large re-feedering operation that was completed in 1935, not to mention production losses during the times repairs were being made.

70 PER CENT OF COST COULD HAVE BEEN SAVED:—One of New York's largest loft type buildings was built in 1919 to accommodate tenants who would each use one or more floors. This type of occupancy was anticipated to get along very well with the original feeder and bay circuiting layout. Within a few years the tenant demand changed to smaller spaces, causing the subdivision of each floor for from two to five tenants. Immediately the load increased beyond the capacity of this building's wiring system. Over $20,000 was spent in revamping the branch circuit layout, the panelboards and the feeders to suit a growing demand. Several feeders were lost before this change was made, which involved two new 750,000 cm. 25-story feeders that were installed to replace smaller feeders that had become damaged beyond repair. It is estimated that 70 per cent of the cost incurred in making piecemeal additions could have been avoided, had the original installation been planned for a gradual expansion in the building load.

To take the high cost out of keeping step with adequacy means, as a rule, an initial installation that costs only from 15 to 25 per cent more in the beginning, but which will enable an orderly expansion in capacity at a fraction of the cost of "wrecking" an unplanned installation.

Thus an extra size service raceway is there to stay and may be used to pull in larger service conductors when they become necessary. If multiple service conductors are permitted in heavy conductor sizes, a sensibly planned routing of the raceway and its connections to service equipment will simplify the addition of further capacity.

Feeders and sub-feeders are rarely so racked in shafts or on ceilings or so terminated at junction boxes or panelboards as to provide space for future additions. Areas in which concealment is essential require spare raceways, or at least oversizes. Abandoned undersize raceways are the price of short-sighted design.

When it is realized that No. 12 branch circuit wire is a minimum for satisfactory voltage in modern commercial lighting, there can be no sensible factor of adequacy without large raceways. The need for No. 10 and even No. 8 branch circuit conductors to serve heavy lighting loads readily shows that money is wasted in layouts that limit such expansion.

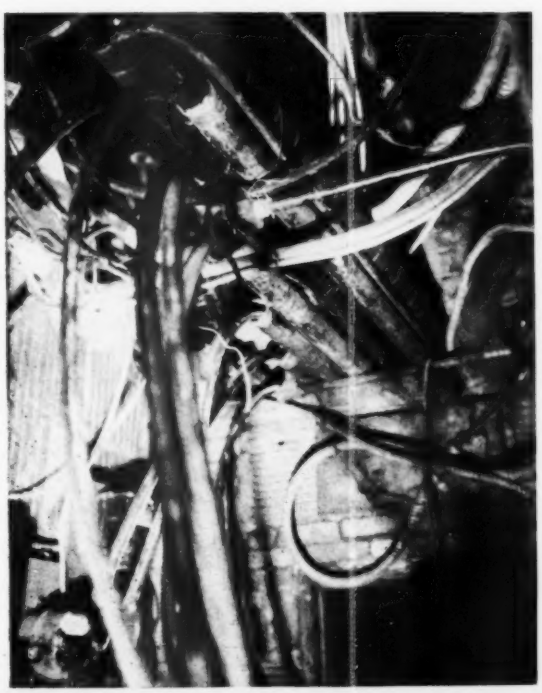
Replacements Costly

Overloaded panelboards usually become junk because of the abuse to which they are subjected before replacement. Adequate planning of load centers, panelboards and switchboards, therefore, requires extra sizes or space provisions for them. For instance, 30-amp. circuits may be provided with parts of 60-amp. capacity; 60-amp. with 100-amp.; and so on, at much less cost than an entire new panelboard will cost. Switchboards and assemblies of safety switches or circuit breakers may be so arranged as to allow for future expansion without excessive cost. Space can be reserved to permit the reinforcement of main busses and for the attachment of additional feeders.

An example of planning to reduce later costly revision is the Chrysler Building in New York. Completed in 1930, it was hailed at the time for its liberal allowance in spare riser capacities.

With changes made on many floors from 200-watt to 300, 400, and 500-watt indirect luminaries, and with about 650 tons of air conditioning equipment in use on scattered floors, the extra feeder capacity that was considered skeptically in 1930 has already been absorbed today. The initial installation cost was perhaps less than one-half the sum that it would have been necessary to spend later on to provide similar capacity.

There are some installations in which the investment in an original excess or reserve capacity would perhaps remain idle too long. However, the proper capacity for a given load requirement is subject to change on short notice. When these changes become necessary, the high costs overshadow any possible economies in low first cost.



An expensive riser shaft alteration job.

Relation of House Wiring Prices to Adequacy

WHAT IS the relation of price to adequate wiring? Have lower prices resulted in more adequate wiring? This has been a moot question in the electrical industry for a long time.

ELECTRICAL CONTRACTING in order to secure the facts has conducted a fairly extensive survey by personal investigations by staff members and by questionnaire to all known electrical leagues. In almost every instance, replies from electrical leagues represented field investigations on the league's part.

A glance at the accompanying table of current residential wiring prices is convincing evidence that, except for the very depths of the depression, prices today are lower than they have been for twenty years or more.

In a number of instances, work was found to be let out at fifty to sixty cents an outlet for labor with the owner furnishing his own materials.

What have been the effects of these lower prices? The evidence shows that during the past ten years there has been a tremendous increase in wiring in residences. Can this increase be attributed to lower prices?

A number of the people who cooperated in this survey pointed out that there was some relationship between the price of wiring and adequacy. In almost every case, however, it was stated that public education and sales promotion efforts had been responsible, and not wiring prices. In fact, an analysis of opinion offered in this survey shows that the effect of wiring prices is not to promote adequacy but rather to reduce adequacy when the price is high. In other words, builders have a limit that they allow for wiring and high prices for wiring simply reduce the amount installed while, on the other hand, a low price for wiring does not mean that the builder will buy as much as the budget permits.

None of the replies indicated that the new lower cost wiring methods that have been introduced in the past ten or twelve years have been responsible for increased adequacy although it is quite apparent that some of these methods have become very important factors in the residential wiring market.

Cheap Prices a Deterrent

Because so much of the house wiring is now being installed on the cut-throat price basis with men fighting for bare existence, the whole philosophy of house wiring selling seems to be — "How cheap can the job be done?" For that reason, today's low prices, if anything, are a distinct deterrent to more adequate wiring.

The survey shows conclusively and unanimously that adequate wiring will come about only when definite sales effort is put behind it and the public is educated to demand it. The survey also shows that, with such a large portion of the residential wiring being done by one-man shops on a starvation basis, that if the help and influence of the better type of contractor is to be had something must be done to make it possible for him again to enter the house wiring market. This undoubtedly means stabilization of the market at higher than current prices.

The interest in the survey and the extent to which so many went to furnish information is positive indication of growing interest in adequate wiring demand. The survey, therefore, would indicate if anything that wiring prices today are probably as low as they ever will be; that public education and prolonged promotion are necessary to promote adequate wiring; and that the local industry is ready to go ahead when the right kind of help and guidance is offered.

Outlet Prices for Residential Wiring

Knob-and-Tube	K & T	Electrical Metallic Tuning	E.M.T.
Armored Cable	BX	Flexible Steel Conduit	F.C.
Non-metallic sheathed cable	RX	Rigid Conduit	Cond.

CITY	TYPE OF WIRING	PRICE	REMARKS
Boston, Mass. (Area)	BX	$1.60 up	Conduit in basement.
New York, N. Y.	BX	3.00	Suburban prices are much lower.
Newburgh, N. Y.	BX	1.50 up	
Scranton, Pa.	BX RX	1.50	
Charlotte, N. C.		2.50	
Greenville, S. C.		1.00–2.25	
Winston-Salem, N. C.		1.50	
Spartanburg, S. C.		1.80	
Cleveland, Ohio	K & T Cond	2.65+	
Detroit, Mich.		1.25	
Indianapolis, Ind	BX	(N) 1.25–1.50 (U) 2.00	
Milwaukee, Wis.	BX	1.50–1.75	Conduit in the basement. Non-speculative, $2.00–$2.50.
Tri-Cities, Ills. & Ia.	BX	2.00–2.50 plus service	
St. Paul, Minn.	E.M.T	2.00–3.00	
Des Moines, Ia.	RX	1.00+	Switch and receptacle outlets, $1.50.
Marshalltown, Ia.	K & T	1.00–1.25 and circuits	$5.00 for 1 circuit and $7.50 for 2 circuits. Outlying towns as low as 75¢.
Omaha, Neb.	K & T	1.60–1.75	
Lincoln, Neb.	K & T	1.00	Workmen doing jobs at average earnings of 30 to 40 cents per hour, no profit on materials.
Minneapolis, Minn.	F.C.	1.75 service	Outside city -- K & T $1.25 to $1.65.
Kansas City, Mo.	BX RX	1.20–1.65	
St. Louis, Mo.	BX	(N) 1.50–3.00 (U) 3.00–4.00	Conduit in basement.
Tulsa, Okla.	Cond.	2.00–2.75	Some labor paid piecework at 40 cents per outlet.
Oklahoma City, Okla.	E.M.T.	2.00	
San Antonio, Tex.	K & T RX	1.25	Some work being done for labor only, builders buying the material.
Leavenworth, Kan.	RX	1.75–2.00	
Los Angeles, Cal.	BX	1.25	The better grades of houses using E.M.T. & Cond. run from $3.50 to $4.50.
Vancouver B. C.	K & T	1.35–2.00	

N–Non-Union. U–Union

Wiring Design Handbook to Promote Adequacy

by Richard G. Slauer
Westinghouse Lamp Co.
Secretary to Industry Committee on Handbook of Interior Wiring Design

FORESIGHTED individuals, but far too few in number, have sensed a grave brake on progress threatened by the inadequacy of electric wiring. Some have seen, too, the wastefulness of small wire sizes and the need to enlarge this "neck of the bottle."

A little more than a year ago, spontaneous demand for definite action led to the formation of an Industry Committee on Interior Wiring Design. Various electrical trade organizations and engineering societies designated individuals among their members to study the whole problem and see if something could be done.

Like the weather, everyone has talked about wiring but very few really attempted to do something. The public was not interested, therefore the electrical industry did not bother itself, excepting perhaps only a very few of those who actually sold wiring devices or installed them. But a 1936 study reveals that everyone must take a decided interest. Wiring is the only path along which the use of electricity may progress. The path is already jammed with traffic.

Because of inadequate wiring, the consumer lacks some of the real benefits of electricity, the utility loses load, the manufacturer of appliances faces too-early saturation, the contractor must hold to a hairline of installation satisfaction, the inspectors must constantly fight the results of attempts to circumvent original specifications that of themselves were of "thin-ice" quality.

The answer to this whole question can only be industry cooperation. Frankly interpreted, this chiefly means "contractor cooperation."

Within a few months, the first results of the committee's activities will be seen in the presentation to the industry of a "Handbook of Wiring Design." The text is already complete, waiting only the official approval of each of the sponsoring organizations.

The Handbook has been prepared partially as a reference book, partially as a text-book. Full use of its material can be made only by those familiar with its scope. This can best be understood by an investigation of the table of contents.

Section 1 persents the reasons for adequate wiring. These seem so fundamental that some may think them unnecessary. But numerous experiences with those in the electrical industry are convincing proof that the public cannot be censured for not understanding, if such a large part of our own industry is uninformed.

Section 2 covers residential wiring, the most important field merely because of the multiplication of units and the vast number of individuals affected. When one considers the things which the great American public considers absolutely essential for daily comfort and convenience in its transportation, amusement, clothing and food, it becomes hard to reconcile these with the inconveniences to which it submits in the matter of wiring. Surely the wiring customer is not insistent upon skimpy copper!

Section 3 covers lighting principles, complete enough only for basic wiring needs. While wiring means power and heat, as well as light, these uses are not as universal nor of such frequent occurence in each structure. Therefore only lighting fundamentals are specifically considered.

Section 4 sets up Standards for Light, Heat and Power Wiring in all occupancies other than residential. These are definitely practical standards, not merely theoretical. To show their application, Section 5 takes the Standards and describes the procedure of using them. The wiring for an individual building is covered in detail, thus explaining in the most basic manner what to do, and how.

Section 6 provides the information long needed to insure proper installation, after the electrical part of a structure has been planned. Only the "chiseler" welcomes indefinite specifications; the well established concern asks only for the opportunity of bidding upon known conditions.

This completes the present Handbook, but it does not complete the work of the committee. As a museum piece, it may have some small value. But as an active force for the promotion of the industry, the committee realizes full well that few successes are the result of chance. It is now studying what it may do merely to promote the fact that there is such a Handbook available to the hundreds of thousands in the industry, following this up with concentrated efforts to specifically educate those who may have the opportunity to directly use it.

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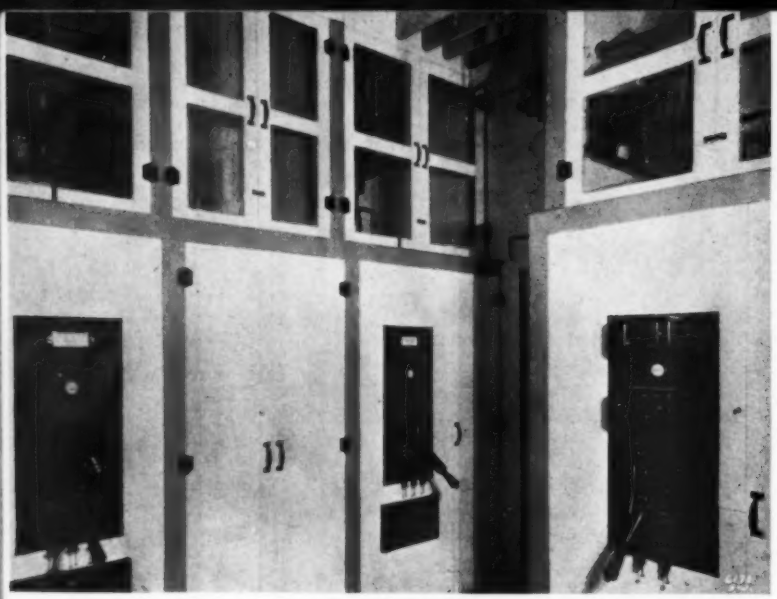


Industrials will buy safe adequate wiring when sold the advantages.

Industrials Will Buy Adequate Wiring *IF SOLD*

by Samuel S. Vineberg

Manager, Electrical League of the Niagara Frontier

from notes prepared by Karr Parker, President McCarthy Bros. & Ford, Buffalo, N. Y.

REAMS have been written about the curtailment of expenses in industrial plants during the last few years, resulting in deplorable electrical conditions in the majority of them. Estimates of the resultant electrical modernization market have been made that shame the old fable of "box car" numbers. And now along comes the 1936 Revenue Act penalizing profits and surpluses, designed to loosen the purse strings of even the most conservative management. If the industrial electrical contractors are on their toes and energetically pursue this business, an unprecedented opportunity is theirs for the effort.

When your business consists in unselling a fellow on a thing he now has, and selling him on replacing it with something else, the main merit of which is that it will save money, then you have to get out of your easy chair and call on the customer at his place of business, and you have to be prepared to do the talking.

Merely calling on your customers is not enough either. You can't expect them to buy a "pig in a poke." You must first make a careful study of your customers' problems, decide on the logical solutions, figure up the cost, then you have something to talk about. Many plants have steam pumps, compressors and other equipment that should be electrified. The majority of factories have inadequate wiring, lighting and obsolete motor drives. In making a survey the contractor should take his instruments and make actual tests—the customer is always more impressed by facts than by opinions.

Here are six fundamental steps the industrial contractor must follow before he can expect to get anywhere selling a prospect on electrical modernization:

1. Make a detailed survey of the customer's plant, paying particular attention to the difficulties, hazards, losses, etc., resulting from the present installation.

2. List each of the instances where improvement can be made.

3. List the corrections that you recommend should be made.

4. Show the economies to be effected as a result of each improvement.

5. Make a detailed estimate showing what each improvement would cost.

6. Map out the modernization procedure, showing each step in the program; how each improvement can be made with a minimum interruption of production; how the program can be extended over a period of time, if necessary, so as to come within periodic budgetary allotments available.

Need Not Fear Gyps

An industrial contractor who is capable of preparing a complete proposal on the above basis need not fear "gyp" competition, or the competition of the ambitious plant electrician who would undertake the electrical modernization program himself after the proposal has been presented, if along with the proposal the contractor can present evidence that his experience and past accomplishments are the client's protection against unsatisfactory execution. The "gyp" contractor is unable to prepare a sound engineering proposal and follow it up with practical engineering installation technique, and it shouldn't take much sales ability to point that out to the customer.

In presenting his proposal, the industrial contractor must do a selling job:

1. He must convince the factory management of the necessity for adequate electrical facilities, stressing (a) increased safety to workmen, (b) reduction in fire hazards, (c) increase in production capacity, (d) lower operating costs.

2. He must educate his customer on the new developments in automatic motor control, improved lighting, circuit breakers, etc.

3. He must be in a position to make engineering layouts and recommendations which are well worked out and which impress the factory owner of the need to make these improvements.

4. He must overcome the disposition on the part of many factories

to purchase materials and do their own work.

There is no substitute for knowledge. Dealers in air conditioning know better than to send a high school boy out to sell their product. Their salesmen must be trained. They must know a lot about air conditioning and about selling. By the same token an electrical contractor can't hope to sell industrial modernization if he doesn't know everything there is to know about it.

To get this modernization business in industrial plants, contractors must have men who know all about modern motor drives, power distribution, lighting controls and automatic devices, power factor correction, etc. Buyers of modernization may not know much about the electrical part of their plant, but it is surprising how much they want to be educated by the salesman calling on them before they will entertain the proposition.

The contractor who has studied his customer's problem and has most carefully prepared his proposal is in a position to sell industrial modernization as it has to be sold today. In the words of Karr Parker, president of McCarthy Bros. & Ford, Buffalo, large industrial contractors, "It has been our experience that factories have plenty of money to spend on electrical modernization if an adequate program is developed for them and they are convinced of its worth."

How to Sell ADEQUATE Residential Wiring

by G. W. Weston

Secretary-Manager
Electric and Radio Association of Kansas City

WILL the public buy adequate wiring, and if so, under what conditions? This is the question which has been perplexing our industry for a good many years, namely, how can we get homes adequately wired so that the flow of electrical products will not be dammed? This question really resolves itself into two parts: first, new homes and apartments; and, second, old or existing homes and apartments.

In Kansas City 80 per cent of the new homes are built by so-called speculative builders for selling purposes and 75 per cent of the new homes are priced below $10,000. That points out our problem in the market. It is to set up a plan that will interest the speculative builder and apply to the low priced homes.

The Red Seal Plan with its free advisory service, outdoor display posters, engraved certificates which are presented to the homes, decalcomania labels which are affixed on the front covers of the fuse panels, and advertising in cooperation with the builders, comprise a plan that is made to order for this market.

The Red Seal Plan will do the job, and it is beyond all understanding why our industry has not realized this and grasped it with white heat enthusiasm. It is doing the job in Denver, Philadelphia, Milwaukee, Toronto, and other cities. In Kansas City the Red Seal Plan has been tested over a ten-year period and it is getting three-fourths of the new homes and apartments adequately wired. Many others fall short of the Red Seal specifications in only a small degree.

Surveys have proved the value of a Red Seal home to our industry over a Non-Red Seal home of the same size, built at the same time and in the same neighborhood, to be from $250 to $400 each. The cost of obtaining a certified Red Seal electric home is between $15 and $20, and this includes the services of a field man for personal contacts with architects, builders and home owners. This is of vital importance. Red Seal homes have 100 per cent more duplex convenience outlets than Non-Red Seal homes and these outlets are the load builders for everything electrical, including radios. These surveys also indicate an increased good will towards our industry on the part of people living in Red Seal homes.

The great mass of existing homes and apartments comprise one of the most difficult problems ever faced by our industry. Special wiring and convenience outlet campaigns have failed. So the problem becomes one of a continuous effort; and, in my opinion, this resolves itself into a house-to-house canvass backed by newspaper, radio and direct mail advertising.

This activity can only be worked satisfactorily by (1) men with good personalities and sales training, (2) a house-to-house canvass, (3) doing the work right there and then, (4) using quality materials, and (5) giving people the opportunity of paying for the work on their light company bills.

A well planned and directed campaign of continuous effort following the five provisions mentioned in the preceding paragraph will place our industry well on its way toward Rewiring America. But whatever name is adopted for a national campaign should be couched in terms of consumer interest — and not ours. That is a mistake that our industry has made more than once. Let's not repeat it.

Red Seal Plan made to order for this market

The Effect of Voltage Drop Due to Overloaded Wiring on

1. *Lighting* 2. *Motor Operation* 3. *Electric Cooking*

1. *Lighting*

by Dean M. Warren

General Electric Company
Nela Park Engineering Dept.
Cleveland, Ohio

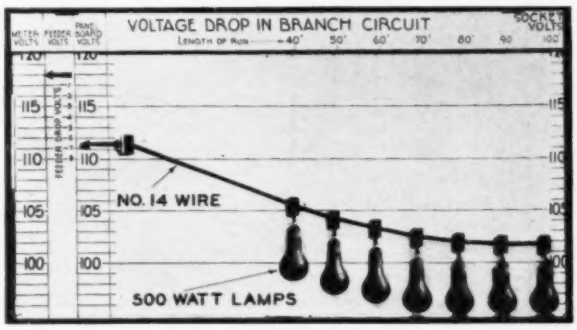
ONE PER CENT in voltage changes the light output of an incandescent lamp about 3.4 per cent and a 5-volt differential results in a difference of about 16 per cent in light output. Moreover, the light lost is of a much better color quality than that remaining, which becomes more and more reddish yellow as the voltage is reduced and the filament temperature drops.

A 115-volt lamp operating at 105 volts gives about 26 per cent less light than at normal voltage. The wattage consumed by the lamp itself, burning 10 volts under voltage, is 13 per cent less than normal. However, if the undervoltage burning were all due to voltage drop in interior wiring, the total energy consumed by the lamp and the resistance in the wiring would be only 5 per cent less than consumed by the lamp itself operating at normal voltage.

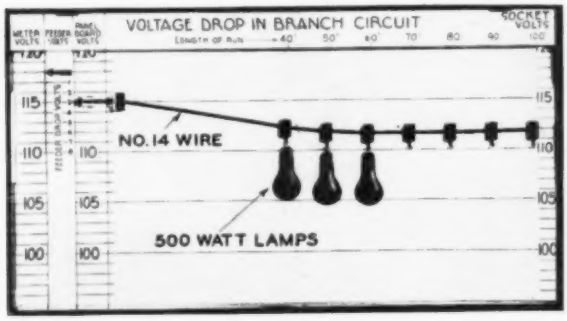
Correcting excessive undervoltage burning caused by poor wiring is an economy. To appreciate the return secured by making such a correction, assume a hypothetical case in which 115-volt lamps are used, but only 105 volts is delivered to the lamps. This condition may seem like an exaggerated one, but it's just what would obtain if five 115-volt 300-watt lamps were used on a circuit with a run of about 156 ft. of No. 14 wire from the panel to the sockets.

Burned at normal voltage the five 300-watt lamps would consume 1500 watts and produce 27,600 lumens. Operated at 10 volts under labeled voltage they consume about 1304 watts and produce only about 20,400 lumens or 7,200 lumens less than at normal voltage. There is a loss of 124 watts in the wiring, so that the total energy consumption is about 1,428. This is only 72 watts less than the five lamps would

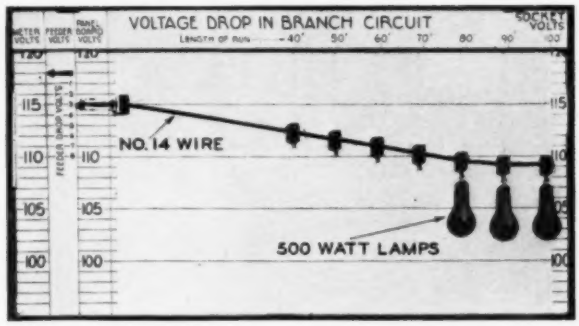
Heavily overloaded circuits are not uncommon, but such conditions result in gross inefficiency of lighting and high unit cost of light.



A 1,500-watt load at 50 feet from the panelboard causes undervoltage operation of lamps when No 14 wire is used



A 1,500-volt load centered at 90 feet from the panelboard causes more serious undervoltage, the effect of which is shown.



take at normal voltage, whereas the loss in light output amounts to 7,200 lumens. If sufficient copper could be used to eliminate the undervoltage burning, the return secured from the additional 72 watts consumed would amount to 7,200 lumens. This represents an increase of 100 lumens per watt, which is over five times the normal efficiency.

Of course, the wiring drop can not be entirely eliminated, but if we replace the No. 14 wire with No. 8 wire, the drop is reduced from 10 volts to about 2.6 volts and the lumens are increased from 20,400 to 25,600, with an increase of only 53 watts in energy consumed. This means that for these 53 watts the customer is actually getting 5,200 lumens or about the light output of a 300-watt lamp.

2. *Induction Motor Operation*

by C. W. Drake

Industrial Division, Westinghouse Electric & Manufacturing Co.
East Pittsburgh, Pa.

THE MANNER in which reduced voltage affects induction motors is rather complex to define involving the particular motor characteristics and the percentage load carried but in the following discussion it is the aim to show how in general the various motor characteristics are affected and the effect in some cases on the driven machines or production.

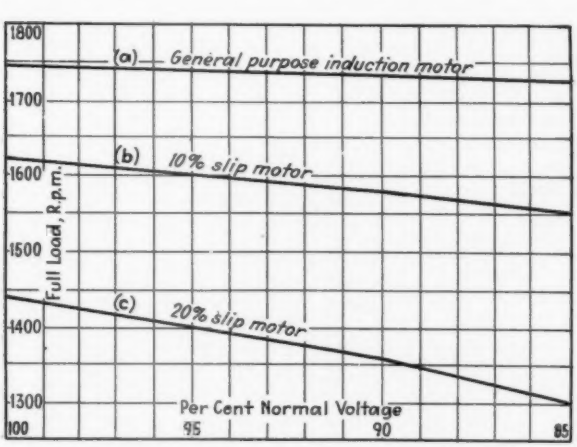
Little Change in Speed

Speed seems to have more attention focused on it than any other motor characteristics. There is quite a prevalent idea that induction motor speed is quite susceptible to line voltage but fortunately such is not the case for the standard general purpose motors.

The synchronous or no load speed of an induction motor is dependent on the line frequency and the number of poles in the motor. Under load conditions, however, a line voltage lower than normal does increase the slip of the motor but if the initial slip is low, as for instance 3 per cent, even a 33-1/3 per cent increase in slip would mean a total of 4 per cent or, only a 1 per cent decrease in motor speed. Technically speaking, the slip or drop in speed of an induction motor varies inversely as the square of the applied voltage. For example, consider a motor having a synchronous speed of 1800 rpm. and a full load speed of 1750 rpm. or a slip of 50 rpm. When operating at 90 per cent of normal voltage the slip will be $\frac{(100)^2}{90} \times 50$ or 62 rpm. giving a motor speed of 1738 rpm. In Fig. 1 the effect of voltage variation on motors with different values of full load slip is shown and the greater effect on the high slip motors is readily evident.

Fig. 1.—Effect of decreased voltage on speed of various kinds of induction motors.

	100% Voltage	*95%*	*90%*	*85%*
	rpm.	rpm.	rpm.	rpm.
(a) General Purpose Motor	1750	1744	1738	1730
(b) 10% Slip Motor	1620	1600	1578	1550
(c) 20% Slip Motor	1440	1400	1355	1300



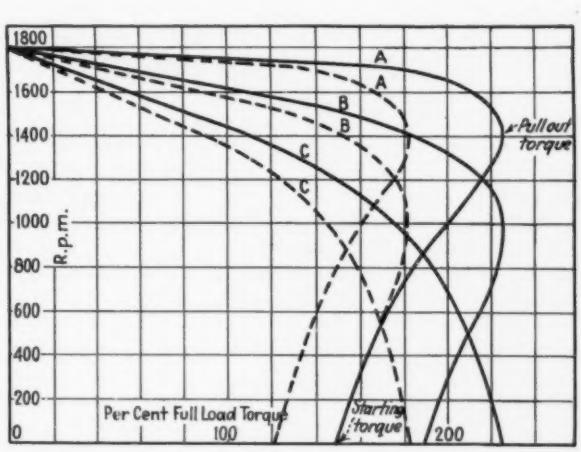
Watch the Torques

Of at least equal importance, and greater in many cases than the effect on the motor speed is the effect on starting torque and the maximum or pull out torque. If, for instance, at normal voltage the motor had little excess torque to start the load it is quite possible that on an overloaded feeder the starting current of 5 or 6 times full load value might so lower the voltage and starting torque that the motor could not start the load. Added to the inconvenience and loss of production there is a possibility of injury to the motor if permitted to remain on the line in this stalled or locked condition.

In Fig. 2 are shown complete

Fig. 2.—Speed Torque Curve—100% Voltage Curves are solid 90% Voltage Curves are dashed

	100% Voltage	*90% Voltage*
General Purpose Induction Motor—Curves A		
RPM at full load	1750	121
Starting Torque	150	1738
Pull out Torque	225	182
10% Slip Induction Motor—Curves B		
RPM	1620	1578
Starting	190	155
Pull Out	225	182
20% Induction Motor—Curves C		
RPM	1440	1355
Starting	225	182
Pull Out	225	182



speed-torque curves for 100 per cent and 90 per cent voltage for the three characteristics of motors referred to in Fig. 1, and for purposes of comparison the same maximum torque values have been used for each motor. These curves are based on the well known formula that the torque varies as the square of the applied voltage. For the general purpose motor it is seen that the starting torque is reduced from 150 per cent of full load to 121 per cent of full load torque and the pull out torque from 225 per cent to 182 per cent. The NEMA specified starting torque on 1150 rpm. motors is 135 per cent and on 850 rpm. motors 125 per cent of full load torque, and consequently a 10 per cent voltage drop at starting may cause considerable difficulty on heavy machinery.

Motors of the 10 per cent and 20 per cent slip varieties are frequently used for intermittent or cyclic duty operation as for instance on extractors, centrifuges, etc., where the principal work done is in accelerating a high inertia to full speed. The time to accelerate such a load is directly proportional to the torque available, consequently a 19 per cent reduction in torque would mean approximately a 25 per cent longer cycle with a similar reduction in productive capacity.

Considering a motor operating at full load torque a decrease in voltage requires an increase in current to deliver the same torque and the copper loss increases as the square of the current. For example, a 10 per cent increase in current means an increase of about 20 per cent in copper loss. On the other hand the iron loss decreases with a reduction in voltage and tends to off-set the increased copper loss. In most motors the iron loss is materially less than the copper loss so that at 10 per cent reduced voltage an increase of from 10 to 15 per cent in total motor losses may be expected. These neutralizing characteristics together with the overload capacity of the motor largely account for the fact that standard induction motors are guaranteed to operate successfully at rated loads and frequency with voltages 10 per cent above or below nameplate ratings but not necessarily in line with their rated performance. As a general rule, when operating at 90 per cent of rated voltage the efficiency is somewhat lower and the power factor somewhat higher than at rated voltage but not necessarily in the same degree.

Maintenance Increased

All the above discussion is on the basis of the motors carrying full load and being installed so as to obtain good ventilation. If the motor is required at times or continuously to carry overloads, if the air temperature is extremely high or the ventilation of the motor impaired by surrounding machinery, the increased temperature due to low voltage will shorten the life of the insulation and tend to cause higher maintenance charges.

▼

3. *Electric Cooking and Water Heating*

by H. J. Mauger

Assistant to the President
Edison General Electric Appliance Co., Chicago, Ill.

THE PRINCIPAL effect of voltage drop on the operation of an electric range is that of slowing up the operation, and that is inconvenient and undesirable from the standpoint of the user.

In the past, electric cooking has had a very serious handicap in overcoming in the user's mind the idea that it was slow. In fact, it used to be quite slow because the manufacturers were not able to put enough wattage into a surface unit or into the oven to enable the range to compete with gas cooking.

Now, however, with high speed enclosed units for surface cooking, unit as fast as gas are available. It is very important then that the normal wattage for which the unit is designed and is marked on the nameplate be maintained.

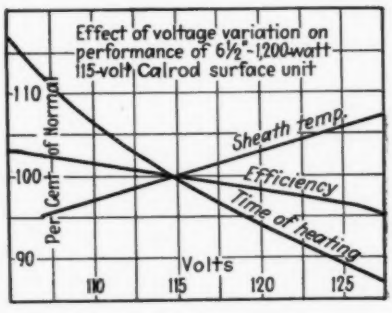
The accompanying curve shows the effect of voltage variation on a 1200 watt Calrod surface unit. This one was designed to be used on 115 volt service, which is most common. A drop in 5 volts, which often happens, will slow up the time of heating about 6¼ per cent. A drop of 10 volts, which sometimes happens, will slow up the heating 17 per cent.

The time required to broil steaks in an oven is much more seriously affected by voltage variation. Here we are dependent upon radiant heat and this in turn is dependent upon the temperature at which the heating coil operates. In the case of a Hotpoint range a standard broiling unit at normal voltage, 230 volts, will broil a one pound steak in thirteen minutes. If the voltage drops to 208 volts or 9½ per cent, it will take 25 minutes to broil the same steak and the quality will not be so good.

The variation of voltage in the oven apart from broiling is not so serious. It will take the standard Hotpoint oven to pre-heat from low temperature to 400 deg. F. 9½ minutes. If the voltage drops from 230 (standard) to 208 volts it will require a minute longer. In the baking operation itself, the temperature of which is controlled by thermostat, there is reserve wattage so that the baking is not usually retarded.

The efficiency of surface units is also somewhat reduced by a drop in voltage as shown in the accompanying curve. The efficiency drops a little more than half as fast as the voltage. It is, of course, obvious that a drop in voltage will cause the heating unit to operate at a lower temperature more or less increasing the life of the heating unit.

As to electric water heating, the effect of voltage is entirely one of wattage input, as the efficiency is not affected. In other words, a 10 per cent drop in voltage will reduce the input to the heater 21 per cent. If the heater is somewhat oversize in capacity, this reduction would not be noticeable. On the other hand, on maximum days when the heater is operating continuously for 14 to 18 hours, the decrease in output would be serious.



An Audit of Industry Assets to Promote Adequate Wiring

▶IN A CAMPAIGN to sell adequate wiring, what are the assets of the industry which can be utilized without extra expense? These assets exist because adequate wiring has a financial significance to every portion of the industry. This symposium covering the different elements of the electrical industry shows what adequate wiring means to each and what assets they can set in motion to promote the idea.

Contractor's Greatest Opportunity

by E. N. Peak
President, National Electrical Contractors Association

THERE are no greater possibilities for the qualified electrical contractor than in an adequate wiring program. Nearly every home, business house and factory should have additional wiring in order to obtain efficient and economical service. Many of these installations were made years ago, when the principal load was lighting. The past few years have changed this demand, yet the same small wires in many cases have remained unaltered. They have become not only inefficient, but are overloaded and constitute a hazard.

Have you ever paused to think of the requirements that have been made of the electrical systems in homes during the past few years? The electrical system has become the ice man, the fireman, the baker, the washerwoman, the maid; it has even taken the place of the sun in some instances. Yet how many people have given consideration to their wiring system, which has been forced to carry this entire additional load?

It seems to be the general impression that as long as the electrical work is inspected, this is all the assurance the public needs that the installations are adequate, safe and convenient. This is not the case. Electrical inspection provides for the correct installation of electrical work, according to city ordinances and the National Electric Code to assure minimum safety requirements. This does not necessarily mean adequate wiring, illumination or power capacity.

Electrical contractors can render a real service to the public in explaining the truth about adequacy in electrical installations. Many owners would be glad to consider an installation of this type, but simply lack the information which would cause them to do so. Educational programs should be set up in each locality, including the inspectors, workmen and all branches of the industry, for the purpose of selling the public on the advisability of preparing for 50 foot-candle illumination, air conditioning, cooking, heating, power capacity, as an economical investment. Any qualified electrical contractor can show many instances where thousands of dollars would have been saved, had proper capacity been provided. The inadequate wiring installation is often used because it is "cheap," but it has proved to be very expensive in many cases in loss of efficiency. The expense of rebuilding an inadequate system makes it a bad investment from the beginning.

From the electrical contractor's viewpoint, an adequate wiring program would be most desirable, if the remainder of the electrical industry, namely, the manufacturers, wholesalers and utilities, would support the contractors who actively enter such a movement and give of their time and money to promote installations which provide the public with electric service at fair and reasonable prices.

After the contractor has done his part in such a program, it is unfair of the other branches of the industry to expect him to meet unfair trade practice or prices put out by men claiming to be electrical contractors.

Qualified Contractors

To make a distinction between contractors who want to cooperate in constructive industry building programs and those whose interest in contracting is purely selfish, the National Electrical Contractors Association has brought out their pledge of cooperation, and has listed certain functions which an electrical contractor should perform in order to justify his position in the industry. Those who operate their business along these lines are known as qualified electrical contractors.

Adequacy in all installations should be sponsored by the industry as a whole, and supporters of such a movement should be given preference over those who do not do their part in this constructive program.

▼

Leagues Need A Plan

by J. E. North
President, International Association of Electrical Leagues

I DO NOT hesitate to pledge the support of the electrical leagues to the promotion of adequate wiring, provided these local market development organizations are supplied with a workable plan.

In many cities, adequate wiring in residential buildings has been pro-

moted with remarkable success, mainly because a program had been thought out and was presented for local application. Leagues that temporarily discontinued their activities in connection with Red Seal or other house wiring programs, now are resuming activities because of the increase in the residential building business.

At this moment, however, I am thinking more of our problem of promoting adequate wiring in commercial and industrial buildings. While this is a different problem, it may be handled pretty much in the same manner and many of the same tools may be used.

The members of the Cleveland League are intensely interested in the subject. However, only a limited amount of work has been done to sell modernization of wiring systems to merchants and manufacturers. We are hoping that at some time in the near future a plan may be presented to attract the interests of the several groups in Cleveland who are to be directly benefited.

We must agree that to sell the advantages of adequate wiring to a non-technical manager or owner of a business is not a simple selling job. We need simple, understandable illustrations, and facilities and equipment for making simple demonstrations. The industry is not lacking in ability to offer wordy explanations of the economical advantages.

Give the leagues a program including illustrating and demonstrating ideas, materials or devices, and then the movement is assured of league participation.

▼

Complete Wiring Expands Manufacturer's Horizon

by C. E. Swartzbaugh
Chairman, Business Development Committee
National Electrical Manufacturers' Association

FOR MORE years than I like to contemplate, the electrical manufacturer has heard the cry that the industry must do something to remedy the present inadequacy of wiring installations in all types of structures. Sporadic efforts have been made to do something about it in addition to the verbal denunciation of the situation. Some of these efforts have been basically sound but the industry, for some reason or other, has not put all its efforts and the necessary financial resources behind any one of them—therefore, the present continuing situation, which has been getting worse and worse.

I shall refer here to only one field, the residential. We have 21,000,000 wired homes, the majority of which have too little copper and too few outlets to permit of the convenient and economical use of the appliances and services we all have to offer. Now we are confronted with a huge home building program to meet existing needs which will add to the present millions of inadequately wired homes. Sales of portable lighting equipment and housekeeping appliances now available are throttled and with new time and labor saving electrical devices, which are continually being developed, the present unsatisfactory condition will be exaggerated.

Unified Action

Surely we are not going to let this state of affairs go on forever; but what are we going to do about it, and when? We can and should band together as an industry, set a goal and drive towards it with all our energy and with all possible speed. On such an effort depends the expansion of the market for every manufacturer of electrical goods from the tiniest fuse to the largest generator, as well as the services of every man and woman in every branch of the industry. The purpose of such an effort would be to sell complete wiring facilities—copper and outlets. That way, and that way only, can we get what we are all after, because that is the only plan behind which we could rally the wholehearted support of all units.

Incidentally, let us try and find some other word for "adequate." The demand for complete wiring installations must come from the public but what does the public know about "adequate wiring"? Who is interested in "adequate" things of any kind? Every person wants the best he can afford and not something that is just "adequate." To me the word connotes mediocrity and none of us wants that.

I have said that the industry should band together to do the job, let us hope it will. In the meantime, and in fact all the time, the individual manufacturer can do many things to help the good work along.

Still referring to the residential market, although realizing that we have the commercial and industrial markets also to provide for, I will offer a few suggestions:

Seven Suggestions

1. Wiring—complete wiring—is basic to the business of all of us. Therefore, we should talk it up on all possible proper occasions. Our friends should hear about it, particularly those who are architects or builders; our employees and our chance acquaintances in the smoking car and elsewhere should be constantly reminded of this necessity.

2. We can see to it that we set an example in our own homes by having a complete wiring installation and letting all and sundry know about it.

3. When we visit friends and note that the lighting intensity is reduced when an appliance is switched on we can explain to them one of the reasons why this happens.

4. We can include mention of the need for complete wiring installations in our consumer advertising.

5. We should insist that any show or exhibit in which we may participate includes a display of a complete wiring installation.

6. Those of us who have a story to tell can arrange to appear before groups of business men and others, tell them of the need for and advantages to be gained by having a complete wiring installation.

7. You may think of other ways to do the job, but finally if a plan to promote more complete wiring installations is developed, and I feel sure it will be, we can all contribute our thinking and help, and some of our money, for the properly selfish purpose of making more business for ourselves and, as a result, more money.

As I see it, the field for our growth is already limitless and complete wiring installations will stretch the horizon of our present possibilities infinitely further.

Adequate Wiring Is Utility Lighting Department's First Duty

by Roy A. Palmer

Illuminating Engineer
Duke Power Company, Charlotte, N. C.

OUR AUTOMOBILES are more useful and therefore of more value to us because of the fine roads and highways throughout the country. The wiring of a building is the highway over which electric service must travel. When that wiring is inadequate, the usefulness of electric service to the consumer is proportionately reduced.

Obviously then, adequate wiring should seriously concern utility executives. The lighting service department representatives of the power companies are perhaps best situated to promote adequate wiring. They are constantly contacting architects, merchants, industrial executives, home owners and others who are concerned with planning or paying for wiring. Very few lighting jobs can be improved without additional wiring and since the customer must be sold on that additional wiring as well as the improved lighting, the way is open to sell adequate wiring for the entire installation.

Current Wastes

Every customer is interested in economical operation. The mere fact that a 50-ft. circuit of No. 14 wire when loaded up to the fuse capacity wastes in heat sufficient current to operate a 60-watt lamp is of interest to all consumers—and is sufficient reason for ruling No. 14 wire off the job entirely.

Isn't it the duty of a lighting specialist to point out to his prospect that if the lights on that circuit burn 3000 hrs. per year, the cost of the current not producing light but wasted because of the undersize wire will amount to $9.00 per year at a 5 cent per kw.-hr. rate? Not only will larger size wire reduce this loss but there will also be more room for a reasonable increase in wattage at a future time. These facts are easily understood by the layman and serve to show the wisdom of investing more money in the wiring than would otherwise be done.

In 1932 a merchant in Greenville, S. C., was moving into a building in which he knew that some wiring had to be done. He budgeted $1,000 for the job. When our lighting service department had worked out the lighting requirements for immediate and future needs, the wiring job totalled $2,200. Naturally this figure, so far above the budget, was almost overwhelming.

It was pointed out that feeders of adequate capacity were needed for the probable occupancy of the third floor and also in the basement for sales area instead of merely storage. It was also suggested that a beauty parlor might be installed later which would have a heavy demand. The merchant insisted that all that expansion would never come about but finally agreed to follow our recommendations. Within two years, every one of those additions were made. Sufficient feeder capacity was available without trouble or further expense. Time was saved in getting the additional departments in operation because there was no undue wait for major changes in wiring. In addition, the branch circuits of No. 10 and No. 12 wire provide economical and reliable service giving that merchant full value for his lighting dollar.

Lighting specialists can be helpful allies to the electrical contractor in selling adequate wiring, because by having nothing to sell he has every opportunity to gain the customer's confidence. His recommendations are made in the customer's interest for economical, satisfactory operation and therefore can convince him of the wisdom of investing money to assure adequacy.

▼

The Electrical Wholesalers' Interest in Adequate Wiring

by Frank Swayze

Supply Sales Manager, Graybar Electric Company

THE other day I was talking to a real estate operator and builder who is in the midst of a worthwhile residential operation.

"Bill," I asked, "how many of your customers—or do you call 'em clients?—ever ask about the wiring in your houses?"

"Frank," said he, "many folks ask about the number of outlets and switches, but nobody asks about circuits and size of wire, and I suppose that is what you are interested in!"

And there in a sentence is the nut of the problem facing the electrical industry, and if that nut is cracked, as it should be and can be, every branch of the industry will benefit.

It seems to me that the answer lies in the old wise crack—"out of sight, out of mind!" Electrical wiring is out of sight and therefore out of mind, and we will not get anywhere until we get it out in the open and focus the attention of the builder and home owner on it and its importance to him and her. Plumbing is out of sight, too, but the plumbing industry has put it very much in the home owner's mind—so that nobody buys or builds a home today without asking about brass pipe, fittings, etc.

We must do the same thing in the electrical industry—and that's the job of every branch of it—manufacturers, contractors, central stations and wholesalers. Every branch should help because every branch will be helped if the job is successfully done.

We, in Graybar, as wholesalers have always been actively alive to the importance of adequate wiring to our business as sellers of wiring supplies, better light and appliances. We have felt, as we still feel, that the answer to the problem lies in the education of Mr. and Mrs. John Q. Public so that they will ask for and insist on plenty of copper—as they are beginning to ask for plenty of outlets and switches. We have taken space in national magazines

and newspapers and time on the radio to preach the story. We have prepared and circulated almost a million copies of educational booklets like "Haywire" and "The Key to Better Living" through contractors to home builders and owners. We try to overlook no opportunity to keep pounding away on the educational front so that Mrs. J. Q. P., when she plugs in her 1000-watt iron, will be getting what she paid for.

Every electrical wholesaler can do his part in this crusade. There are many ways in which he can be of service.

First: Just as he is a distributor of merchandise he can likewise be a distributor of information and help. He can develop his own literature or he can use that which is available. But in any event, he can distribute it and helpful advice to his contractors and their customers.

Second: He can impress on his own organization the importance of adequate wiring, and insist that his employees practice what they preach (making sure that they do some preaching to friends and relatives alike) by having their own homes properly wired.

Third: He can cooperate in industry programs that have as their objective, education and promotion. We wholesalers fit into this program. We have a part to play in the over all industry game. When that part is assigned to us, let's give it all we have.

A Natural

It seems to me that this question of adequate wiring is one of those natural promotions that happen just once in a while. Here is something that helps everybody. It helps the home owner who profits from it every day in every electrical way, just as it helps the contractor who installs the job, the wholesaler who supplies the material, the manufacturer who makes it, and the power company that pumps the current through the channels made big enough to carry all that's wanted.

Any promotion that's as basically right and sound as this will go across—because being right everybody will be behind it, and when the electrical industry as an industry gets behind something — it goes across!

▼

The Safety Factor of Adequate Wiring

by Oscar M. Frykman
Chief Electrical Inspector Minneapolis, Minn.

TO PROTECT the public against the sure-to-come mishaps of inadequacy presents a major problem for the electrical inspector. Powerless at the time to do anything but grant his approval of a new electrical installation that is correctly installed, experience tells the inspector that it is but a matter of perhaps a year or two until many such wiring systems have become incapable of carrying the burdens imposed upon them. But an innocent public assumes that inspection provides a safeguard far into the years ahead. They do not know that there is no definite safety factor without adequate wiring.

Every inspector is therefore more or less an advocate of adequate wiring out of sheer self defense.

The public, first of all, expects protection against fires; accidents; and service interruptions that might be caused by the condition of its wiring installation. Each of these three points is a logical argument for adequacy, without bothering to go into many other considerations, such as convenience, flexibility, lamp efficiencies and the like.

Fire hazards accumulate quickly when the original installation is inadequate. If lighting outlets are grouped at the outset upon a bare minimum number of circuits, the first increase of lamp wattage generally brings over fusing. In the meantime, the overloaded conductors are causing rapid deterioration of the insulation. Failure to provide a reasonable leeway in circuit capacity invites breakdowns in the conductors, causing grounds, overheated terminals, damaged load centers and expensive repairs. Inspectors, generally, are unable to see to it that such repairs are made and that corrective measures are taken before a fire loss occurs.

Insufficient outlets are the lifeblood of the inspector's nemesis—the bootlegger and the handyman. This elusive character thrives on the patch jobs, the half-there job which receives no inspection. Again the public suffers. Its safety factor is lowered not only by original inadequacy, but by the addition of substandard and makeshift wiring to an over-loaded system.

Performance

The cost of service failures is perhaps the most reasonable argument for adequacy in commercial or industrial wiring. Whether it is a merchant, a processor of perishables, or a small factory, one shutdown can cause a far greater loss than the cost to provide a reasonably adequate safety factor. Every inspector knows of many small factories and commercial buildings in which the service and feeders are barely within the minimum limits of capacity. The first increase in load places one or more occupants in danger of service interruptions.

There is a greater scope to adequacy than merely planning the service and feeders, and planning the locations of outlets upon a liberal circuiting scheme. The locations and performance of other materials and devices, such as controls, distribution equipment, wiring devices and lighting equipment, have much to do with their safe use. When inferior or low-capacity devices are used, there is bound to be a never-ending maintenance problem that leads again to fires, accidents, and interruptions.

Finally, to prevent the defacement of completed buildings and their interior finish, wiring must be planned for taking care of its future electrical needs. Perhaps one-third of our hazardous cord extensions are tolerated because owners dread the possibility of marred walls or floors. In other instances, contractors will mutilate the insulation on new conductors to pull them into existing raceways that are too small. Someone skimped the job originally, and now the customer won't tolerate exposed wiring or condone the channeling of finished walls.

When adequacy is disregarded, safety factors fly out the window. When jobs are planned to take care of future requirements, the owner

saves money in the end, make-shift remedies are not needed, the handyman doesn't create fire hazards, and the original inspection certificate still bears a semblance of assurance that the owner's wiring is safe.

▼

Relation of the Architect to Adequate Wiring

by C. A. Rowley
Pasadena, Cal.

IS THE architect interested in adequate wiring? If so, what and why is his interest? Can he be sold adequate wiring? How?

If we assume that the architect referred to is the type who keeps his mind open to suggestion and his eyes open for the latest and best developments then the answer to the first question is an obvious and unhesitating YES.

The what and why of this interest falls under two chief heads, viz., Self Interest and Customer Interest.

Every architect takes great pride in his work. He delights in turning out a perfect project and realizes that to be perfect, it must be adequate as well as beautiful.

Also, every architect is jealous of his reputation. He attaches a great deal of importance to what his associates think of his work, and so is keen to perfect it in every detail. The better his reputation the more work he gets. So, his self interest in adequate wiring is very real and very abiding.

Granted that the foregoing are facts, the third question is all ready answered in the affirmative, and it only remains to say how this selling job can best be accomplished.

It is doubtful if the electrical industry as a unit has realized the strategic importance of the architect in selling electrical equipment. His clients, having paid for expert advice, are very largely guided by his opinions.

The architect, therefore, should hear a true story, chock full of basic facts and figures and shorn of extravagant statements. We need his help, and can have it in exchange for keeping him reliably informed on things electrical, and assisting him in the practical solution of his electrical problems.

In the past, this has been left to individual manufacturers who too often have allowed prejudice in favor of their own products to get the best of their engineering judgment.

What we need, I believe, is a little less emphatic selling effort in behalf of individual products and a more intensive and sustained joint effort in selling the electrical idea through the medium of adequate wiring. We cannot of course conceal the fact that we are out to sell more and more electrical equipment,—nor should we try to. But we can and should make every effort to convince the architect that we are not trying to sell him needless equipment nor equipment unsuited to the job.

Specifically, my suggestion is that we work out some way to offer the architect a truly unbiased, efficient and individual specification service for the smaller jobs on which he cannot afford to employ a professional engineer.

The Master Specification form appearing in the June issue of ELECTRICAL CONTRACTING is a big step in the right direction. It covers the general field fully but does not and cannot supply the individual engineering so essential to a truly adequate layout.

The electrical idea is spreading, presenting a new problem and a new responsibility to the architect. He is less capable than ever to specify what he needs electrically and fully realizes the increased gamble in taking bids without rigid specifications.

This, then, is our big opportunity. We can well afford to supply the engineering ability necessary to make each electrical specification rigid and binding. Such a service is bound to meet with the approval and win the support of all practicing architects with a real desire to build adequately for the present and future.

▼

Inadequate Wiring Is No Joke —to the Dealer

by L. E. Moffatt
Editor, Electrical Merchandising

FOR YEARS at fairly regular intervals I have been receiving clippings of a particular type of cartooned joke that is a part of the cartoonist's stock in trade, and evidently sure fire. It is the one about the cords connecting percolator, toaster, waffle iron, etc., to the lighting fixture over the table. Sometimes little Johnny is lost in the tangle, and sometimes it's grandpa that gets his whiskers involved, but always the idea is the same: The extreme inconvenience of modern electrical conveniences.

The cartoonist has it on us—his joke is not funny to the electrical dealer, because it reflects a condition that costs the electrical trade an uncounted amount of business.

But, although the entire retail electrical trade is hampered by this condition, it has with few exceptions made no effort to correct it. Merchandising utilities have from time to time staged a drive to sell additional outlets. These drives have been pretty expensive affairs, and the results have been limited. Refrigeration dealers have sold a large number of single outlets because the outlet had to be sold if the refrigerator was to work. Radio dealers have sold some outlets for the same reason. But nothing like the large scale enlistment of dealers in awakening the public demand has been undertaken.

The one force likely to bring dealers actively into the promotion of better wiring and more outlets is the Kitchen Modernization Campaign. This activity is just getting under way, but already it is showing surprising results. Dealers are surprising themselves at the number of prospects being uncovered by planning a modern kitchen and selling not one device, but a complete job. Good and convenient wiring is

the very base of such a plan. Educated to sell kitchen wiring, the appliance retailer will not stop, he will go all over the house. Keen for sales, he will learn by demonstration that selling more outlets and heavier copper is a profitable part of his operation.

▼

Selling Adequate Wiring to Builders

by G. W. Austen

Manager, Electric Service League, Toronto

OVER a period of about a dozen years, in which the Electric Service League of Toronto has obtained a total of 22,000 Red Seal homes, a great deal of experience in selling adequate wiring to builders has been obtained. About 98 per cent of these 22,000 Red Seal homes were new construction. As the league has averaged from 85 to 90 per cent Red Seal, compared with the total volume of building, it will be seen at once that it has extraordinary success in the builder field.

If adequate wiring is to be put over with speculative builders, there must be a definite mark to shoot at. The average speculative builder is interested in keeping his costs down. The way to keep him in line with a proper installation is to establish a generally accepted standard to which he must conform. Builders are in keen competition with each other. They watch each other's houses. Thus when adequate wiring installations are distinguished by a trade mark on the house, and the public is sold on the idea of looking for it, for their own protection, the job of selling the builder becomes much easier.

Along about 1925, when the league had 40 or 50 builders co-operating in putting in Red Seal wiring jobs, it conceived the idea of tying them in by forming a "100% Red Seal Builder" list. To be on this list, the builder must sign an agreement to wire all the houses he builds during the current year to Red Seal standard. The league ran some newspaper ads of these lists, and rapidly built up the list the first year to about 200. It has had as many as 425 speculative builders on this list in one year. When the builders are thus nailed down, so to speak, by a signed agreement, the missionary and field work becomes much simplified. This system is vital to the operation of Red Seal work on a mass basis.

The selling of adequate house wiring on a piece-meal basis, without an acceptable specification to work to, is like trying to shoot birds in the dark. Once in a while you may hit. Builders know something about wiring and electrical equipment; but it is no bigger to them than concrete, brick, lumber, plumbing, hardwood finish, or a dozen other items in construction. Many of them know little about what constitutes proper wiring. There has to be someone specializing on this on behalf of the industry. So the function of a league service in maintaining a wiring standard, in acting as the friend and protector of the builders, is vitally important to the industry.

The whole situation sums up into this fact: Adequate wiring on a mass basis, dealing with a large building program, has to be built on a broad, business-like system based on established standards of practice. These standards must be good but simple—ones that the public can understand. The standard must be within reach of the average builder and average homebuyer.

▼

For Employees Adequate Wiring Means Employment

FROM all of the foregoing articles it is apparent that every branch of the electrical industry, and such contributing factors as architects and builders, have a stake in adequate wiring and a definite part to play in its promotion. But what of the hundreds of thousands of wiremen, salesmen, engineers, clerks, factory hands and other employees of the industry? Does adequate wiring mean enough to them that they can be expected to play an important part in any widespread promotional program?

The answer is simple. A program to promote adequate wiring in both old and new buildings should remove for years to come the threat of unemployment in the electrical industry for employees of contractors, manufacturers, wholesalers, utilities, or inspection departments. Not only does it mean more labor and material sales in the wiring division of the industry, but it means a tremendous increase in sales of appliances, kilowatt-hours, equipment, and back of them, the distribution facilities. The hardships of the depression have not yet been forgotten. Men and women of the industry will be eager to engage in any activity which will offer them employment opportunity insurance.

This vast army of men and women can be trained to do their part to promote adequate wiring in many ways, such as the following:

1. Discuss adequate wiring with all of their friends, relatives, neighbors and acquaintances.

2. Have their own homes adequately wired and tell people about it.

3. Give talks at churches, fraternities, schools, and other local meetings.

4. Wiremen should never leave a job without trying to sell the owner on a more adequate installation.

5. Look for inadequacy whenever they go visiting and point out such leads to a central agency.

To do these things, it will be necessary that the industry take special pains to educate its own people, not only on what constitutes adequate wiring, but the selling points from the standpoint of public benefits and safety features. Since it is difficult to maintain a sustained interest among employees, even though it is to their advantage, a program should be worked out whereby this information is sent to them not all at one time but a little bit at a time.

A tremendous help in general promotion can come from the employees of the industry but it will depend entirely upon their education and the means taken to stimulate and hold their interest.

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The age of an organization, in and of itself, is inconsequential. On the surface, of course, the ability to ride through the storm and stress of business vicissitudes for many years is indicative of sound management and an acceptable product—provided—?

Yes—provided—that at all times along the line, such an institution has kept in step with the demands of its market or ahead of such demands, and with each succeeding year has envisaged the future and prepared for it—referring to things past, mainly for guidance in deciding what to do or what not to do.

A business organization must keep its arteries young—it must add new blood—and never may ride for long on momentum.

These things and many more have been realized as we have progressed slowly but surely year by year.

Even through a depression, a carefully organized institution can progress. Though volume of sales decrease and earnings are "red," it still can gain in knowledge as it prepares for the betterment bound to follow in due course, though sometimes painfully prolonged.

Age alone is no final proof of the worth of any firm in business, nor an apparent argument in favor of its product.

Its age, however, as interpreted in its accumulated knowledge in the operations of its various departments—in a balanced management—a balanced distribution—a balanced selling policy—with skilled and experienced engineers—skilled and experienced operators—its expanded facilities for development, and its many lessons learned over the years—I say, its age under such conditions is an asset of intrinsic value and most naturally is tangibly translated into the product it sells.

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"TRUMBULL CHEER," July, 1936

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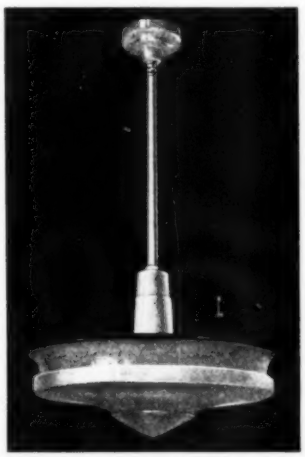

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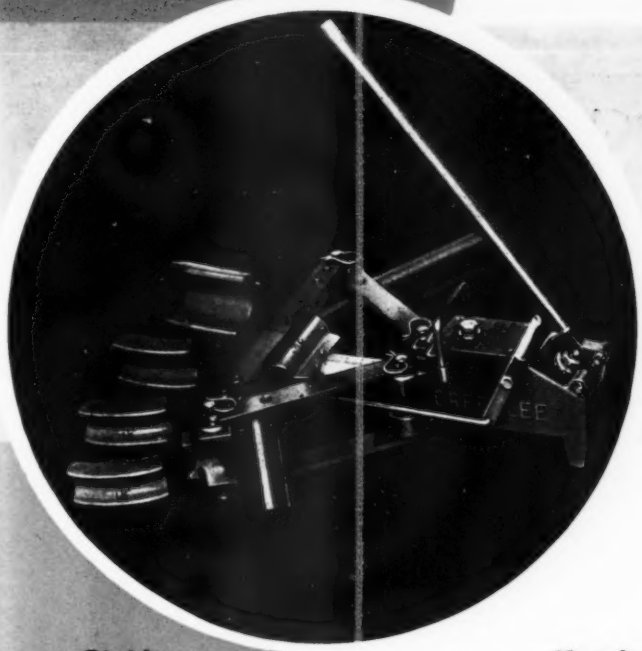
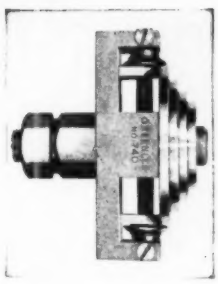


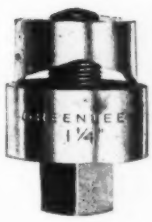
Rigid Conduit Benders

Above is the Greenlee Hydraulic Bender for rigid conduit. It is simple to operate, easily portable, and makes smooth bends quicker and easier than by other methods. No. 770 bends all sizes from 1½ to 3-inch. The larger bender, No. 775, handles all sizes from 2½ to 4½-inch.



Knockout Tools

Greenlee Knockout Tools enlarge holes for conduit quickly and accurately, without reaming or filing. Convenient to operate. The two punch sets will make holes for conduit from ½ to 2-inch, while the cutter will handle sizes from 1½ to 3-inch.



Boring Tools

For boring holes at high speed, the Greenlee No. 31 Electricians' Bit is recommended. Known as the fastest boring tool on the market it has a double-spur head for long life and a coarse screw point for fast feed.

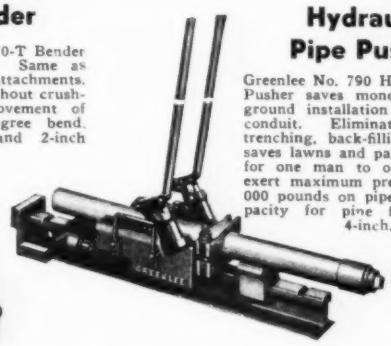
When a long reach is needed, a Greenlee Bit Extension is the ideal tool. The No. 900 will drive bits up to 1-inch and follow a ⅝-inch tool. A positive lock always prevents the bit from coming loose and being lost in the work.

Thin-Wall Steel Conduit Bender

Below is the Greenlee No. 770-T Bender for thin-wall steel conduit. Same as No. 770, but with different attachments. Bends quickly and easily, without crushing. Complete forward movement of the ram makes full 90-degree bend. Will handle 1¼, 1½, and 2-inch conduit.

Hydraulic Pipe Pusher

Greenlee No. 790 Hydraulic Pipe Pusher saves money on underground installation of pipe and conduit. Eliminates much trenching, back-filling, etc., and saves lawns and pavement. Easy for one man to operate. Will exert maximum pressure of 40,000 pounds on pipe clamp. Capacity for pipe from 1¼ to 4-inch.



The greater the efficiency of the tools you use, the more chance you have of meeting competition, improving the quality of your work, and realizing a real profit on every job. That is why every alert contractor should have first-hand information on the very latest in wiring equipment.

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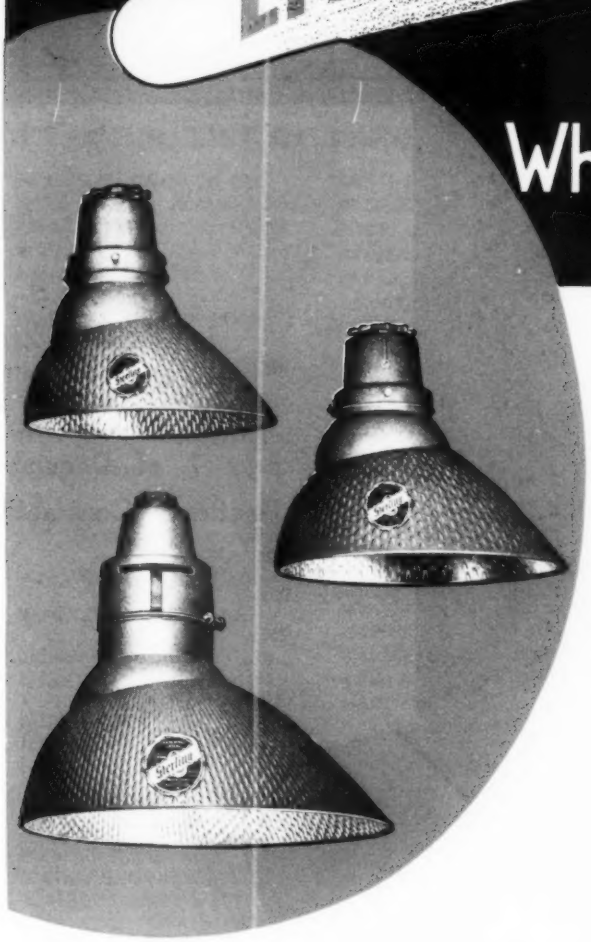

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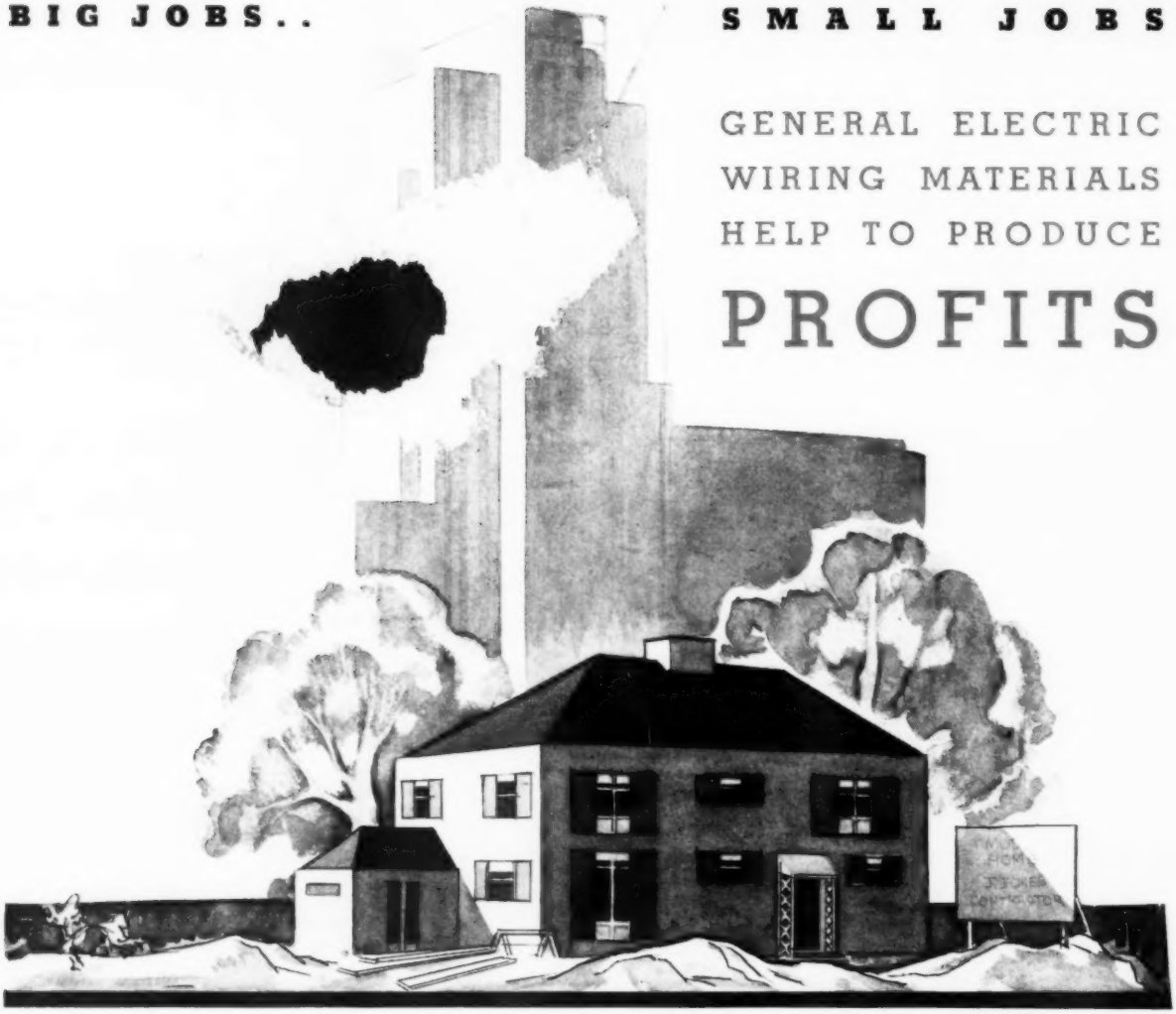

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